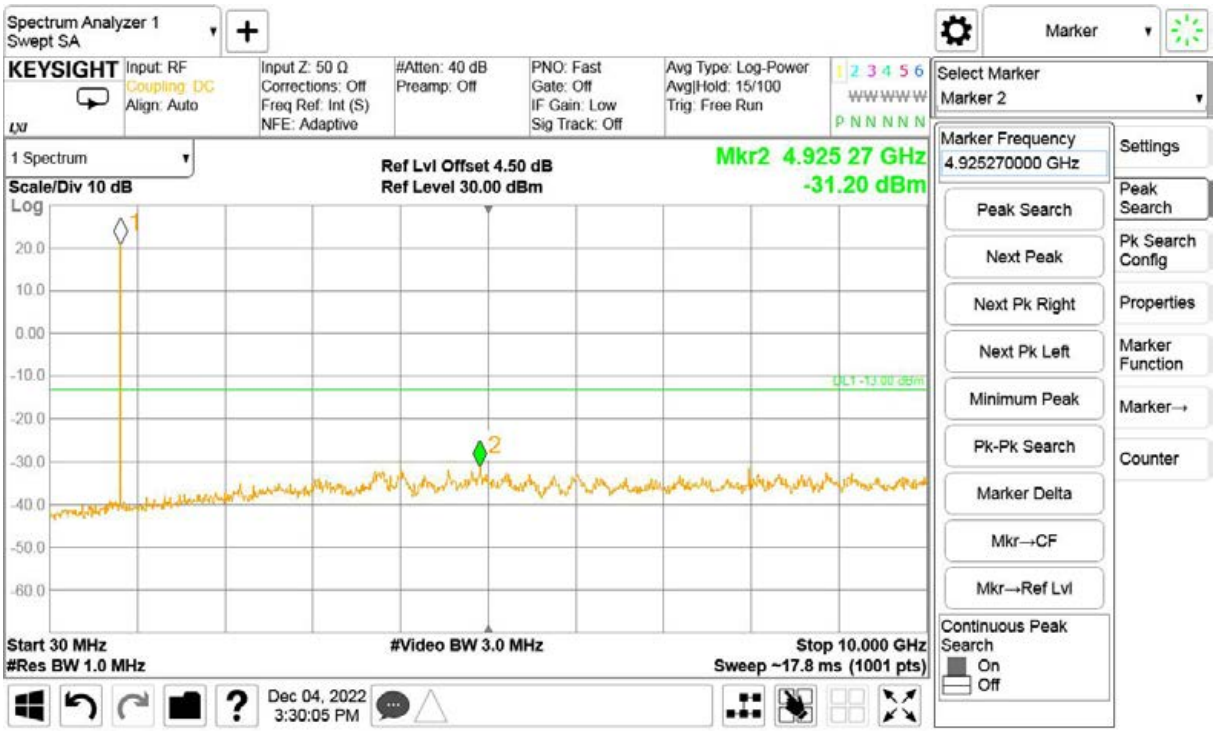
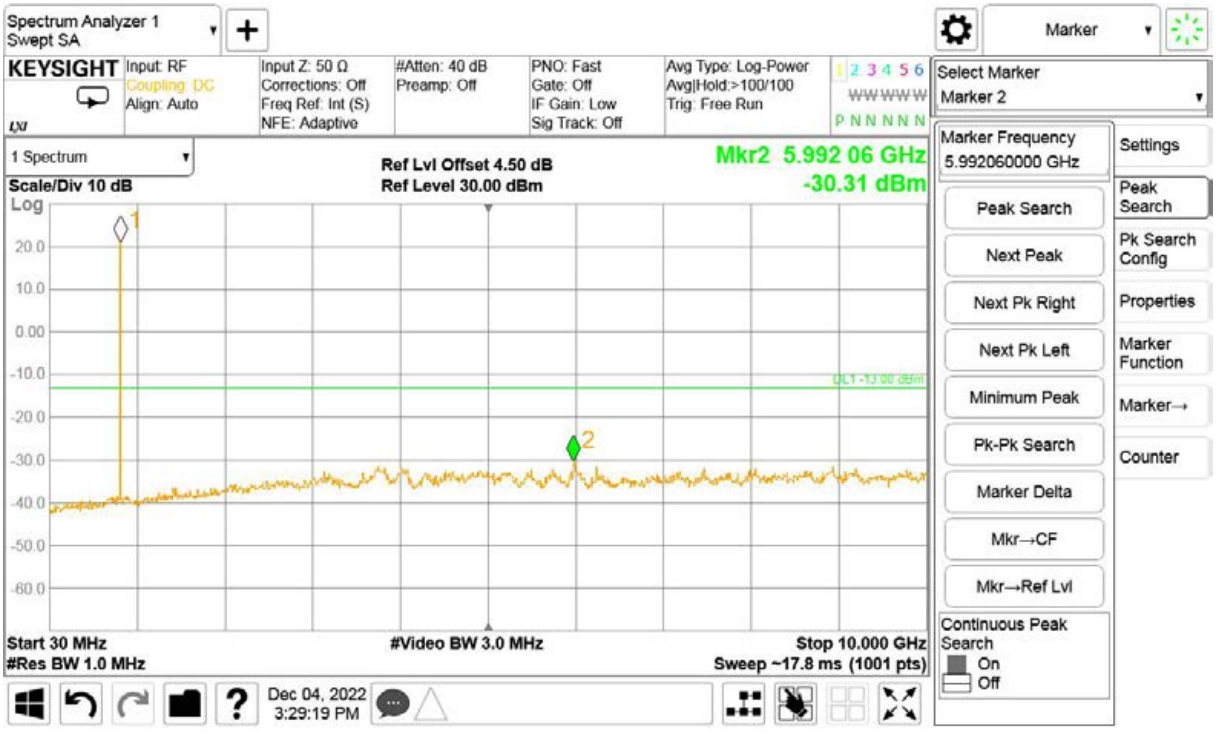
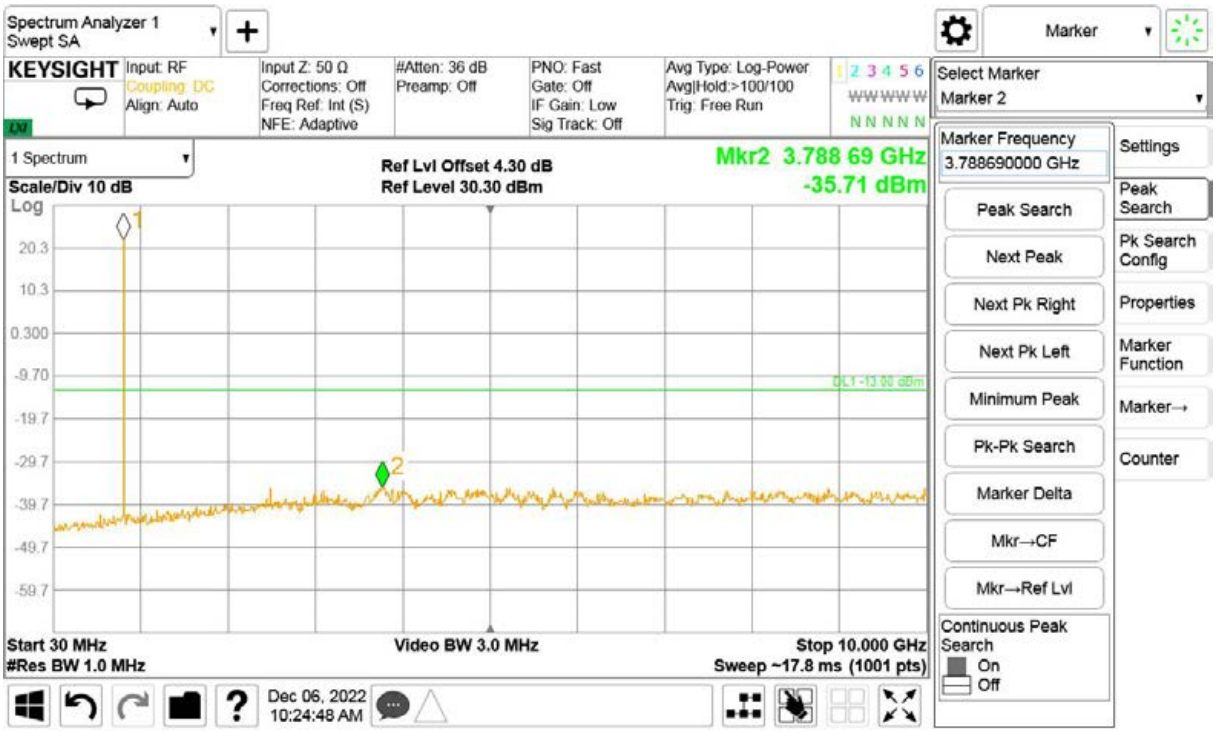


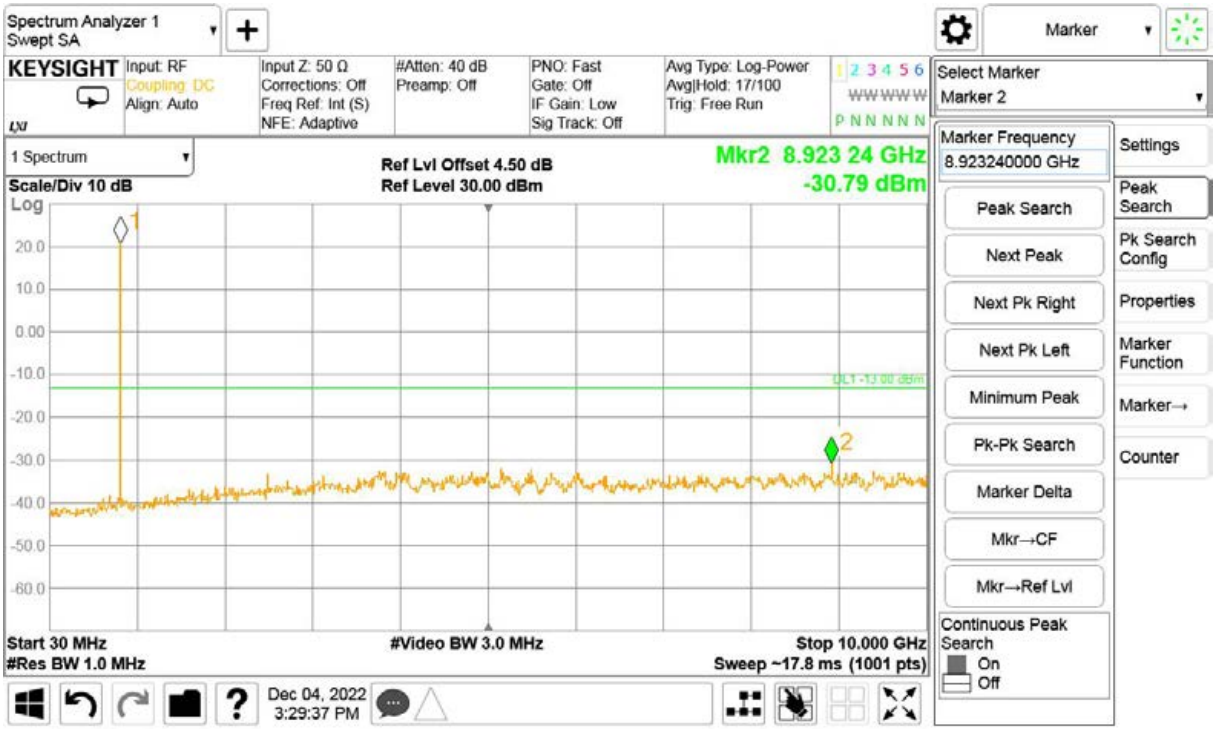
30MHz to 10GHz, Mid Channel, Subcarrier (3.75kHz), BPSK, 1@0



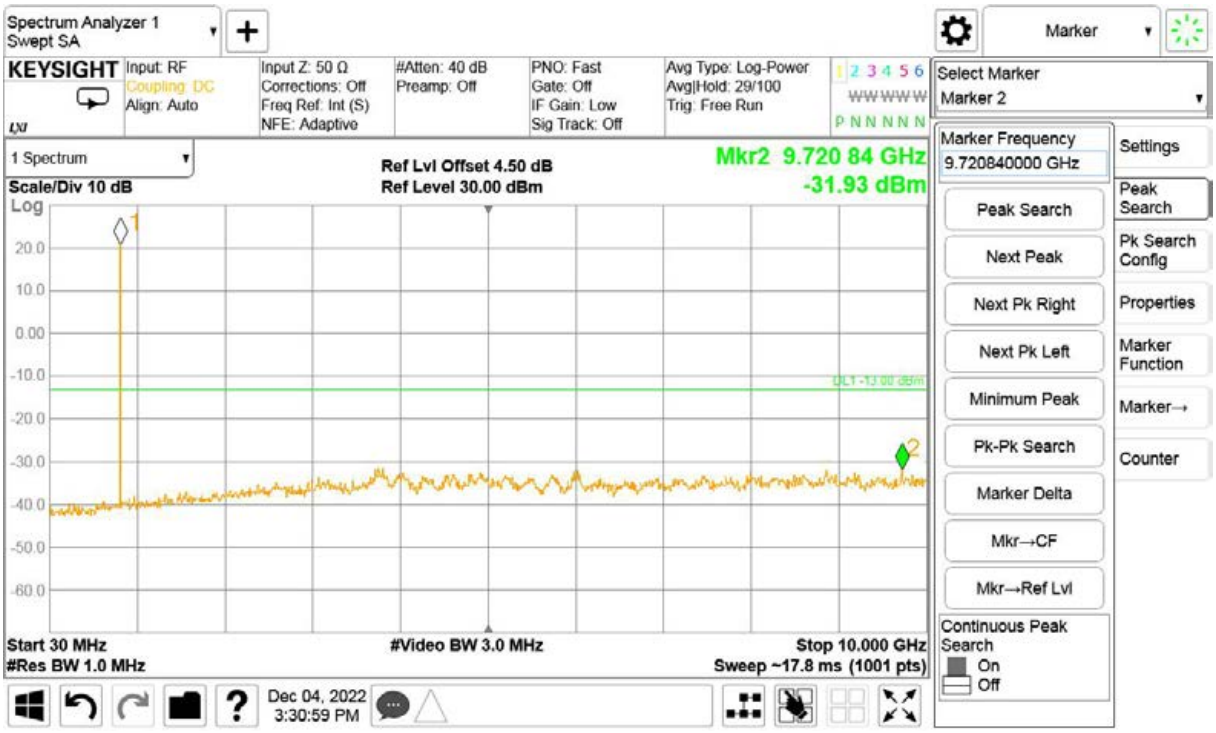
30MHz to 10GHz, Mid Channel, Subcarrier (15kHz), QPSK, 1@0



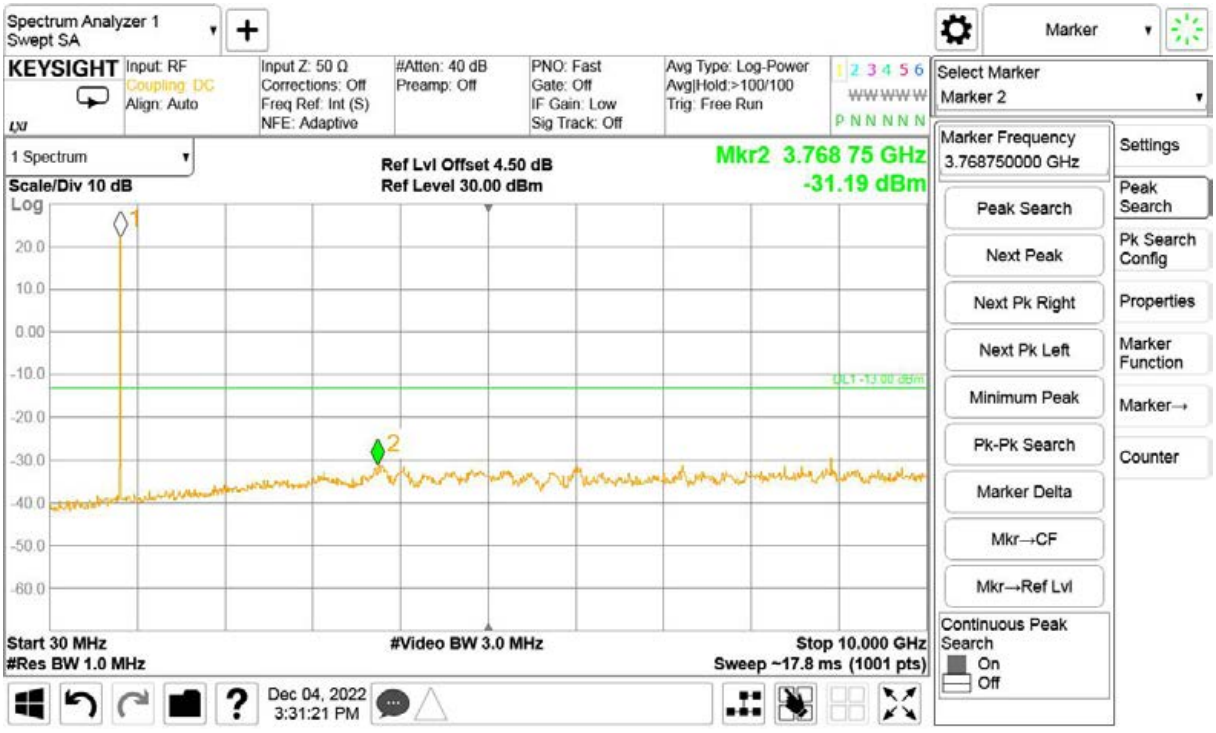
30MHz to 10GHz, Mid Channel, Subcarrier (15kHz), QPSK, 12@0



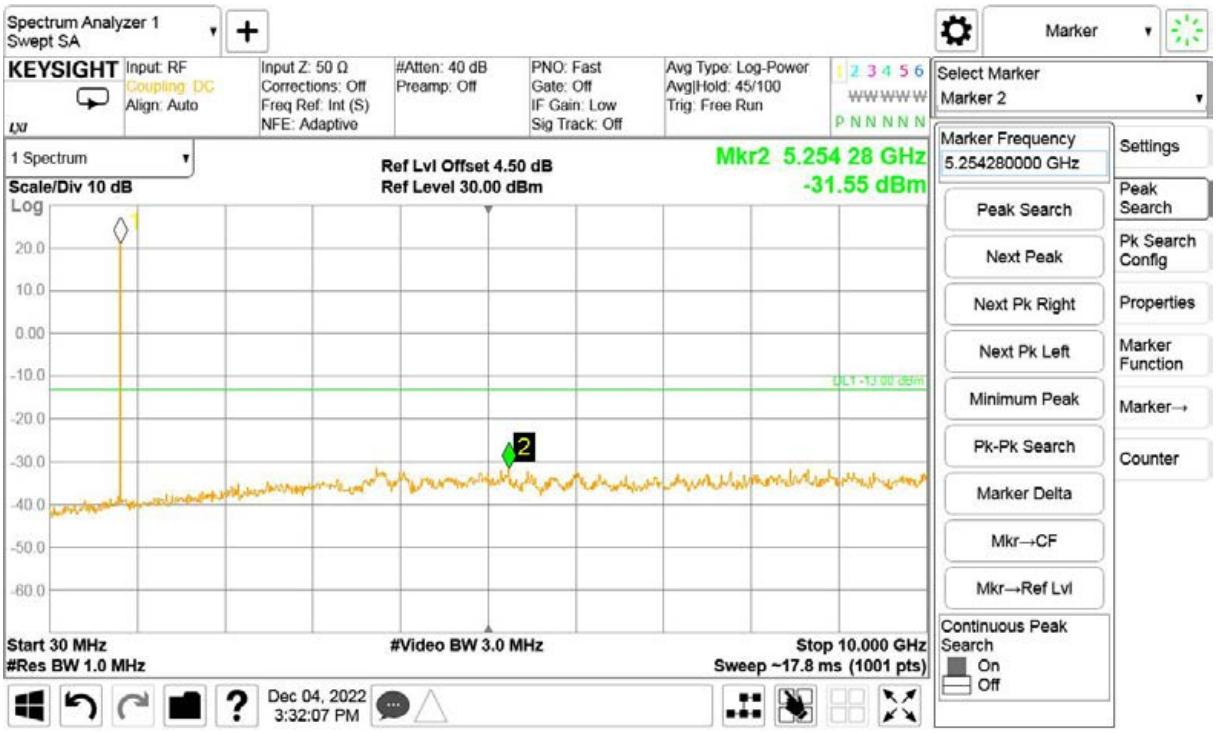
30MHz to 10GHz, Mid Channel, Subcarrier (15kHz), BPSK, 1@0



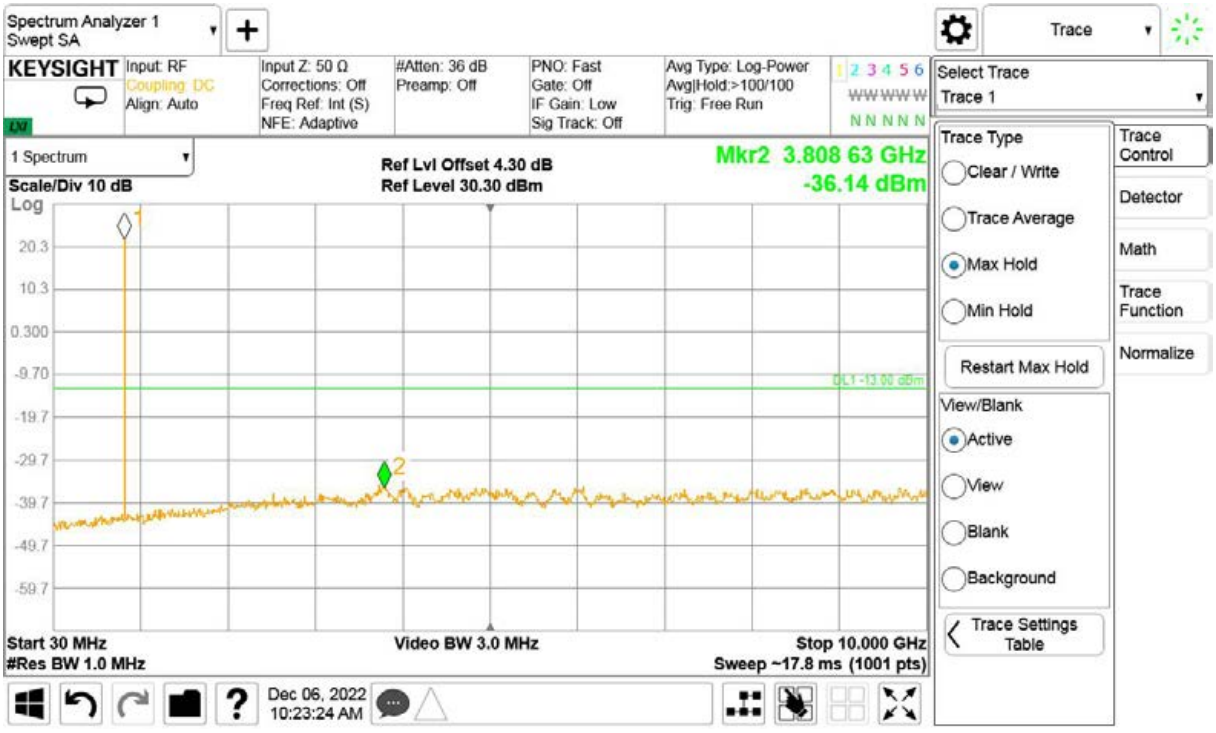
30MHz to 10GHz, High Channel, Subcarrier (3.75kHz), QPSK, 1@0



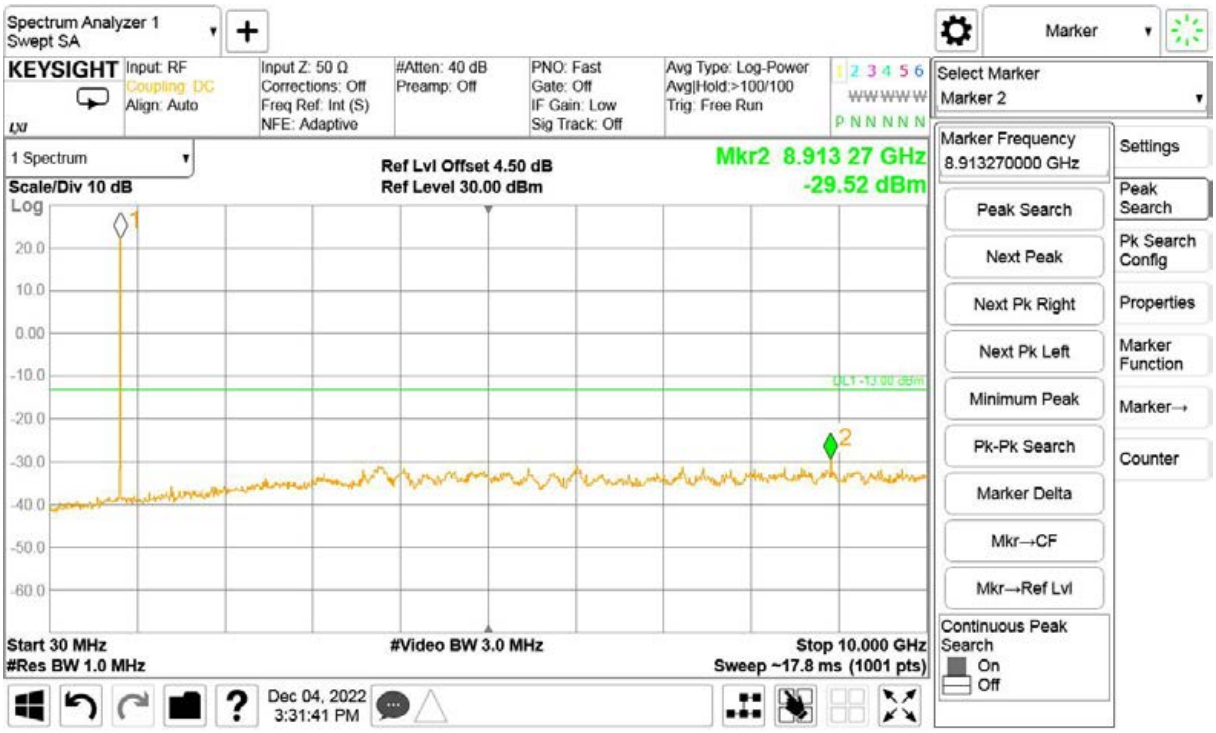
30MHz to 10GHz, High Channel, Subcarrier (3.75kHz), BPSK, 1@0



30MHz to 10GHz, High Channel, Subcarrier (15kHz), QPSK, 1@0



30MHz to 10GHz, High Channel, Subcarrier (15kHz), QPSK, 12@0



30MHz to 10GHz, High Channel, Subcarrier (15kHz), BPSK, 1@0

6.5. Radiated Spurious Emission

Specifications:	FCC Part 2.1051, 2.1053, 22.917
DUT Serial Number:	866884049909625
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB, so the limit level is: P(dBm)– (43 + 10 log(P)) dB= -13dBm.

According to Part 27.53(c):

On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

According to Part 27.53(f):

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

According to Part 27.53(h):

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 Bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10(P) dB.

According to Part 27.53(g):

For operations in the 600 MHz Band and the 698-746 MHz Band, the power of any emission outside a licensee's frequency Band(s) of operation shall be attenuated below the transmitter power (P) within the licensed Band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution Bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

According to Part 90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as

follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Limits for Radiated spurious emissions(UE)	
Frequency range	**Limit Level /Resolution Bandwidth**
30 MHz to 20000 MHz	-13dBm/1MHz

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty（30MHz-150MHz）	5.15 dB (k=2)
Expanded Uncertainty（150MHz-1GHz）	4.09dB (k=2)
Expanded Uncertainty（1GHz-3GHz）	2.92dB (k=2)
Expanded Uncertainty（3GHz-6GHz）	2.93dB (k=2)
Expanded Uncertainty（3GHz-20GHz）	2.69dB (k=2)

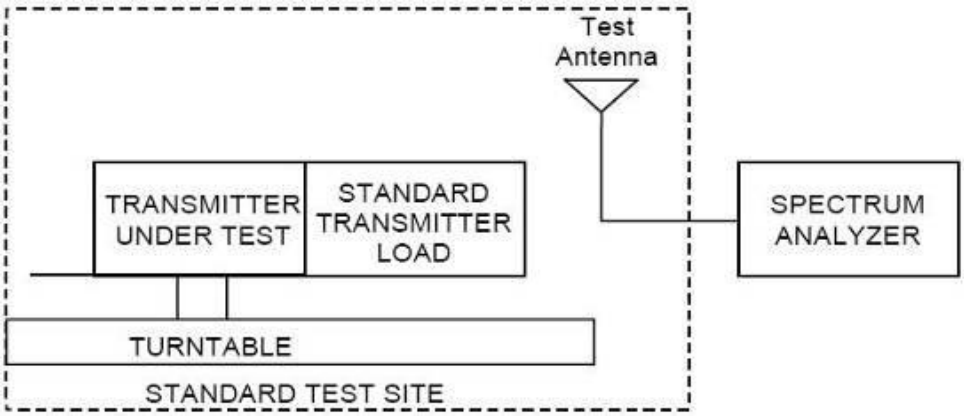
Test Setup:

The EUT was placed in an anechoic chamber. The Wireless Communications Test Set was used to set the TX channel and power level and modulate the TX signal with different bit patterns.

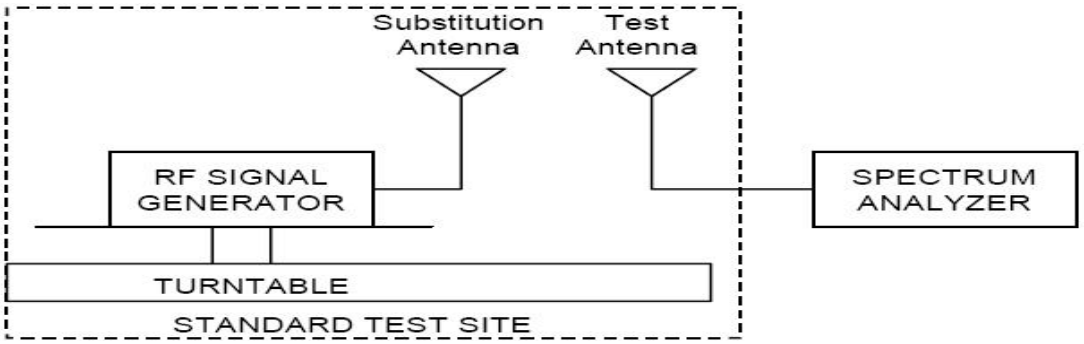
Test Method:

The measurement method is substitution method accordance with section 2.2.12 of ANSI/TIA-603-E: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

(a) Connect the equipment as illustrated and measure the spurious emissions as the method as above. The distance from the device to the antenna is 3 m .



(b) Reconnect the equipment as illustrated.



(c) Remove the transmitter and replace it with a substitution antenna. The center of the substitution antenna should be approximately at the same location as the center of the transmitter.

(d) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

(e) Repeat step d) with both antennas vertically polarized for each spurious frequency.

(f) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps d) and e) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

P_d(dBm) = P_g(dBm) – cable loss (dB) + antenna gain (dB)

where:

Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.

Test frequency：30MHz-20GHz
All modes were tested,only the worst case was reported.

NB-IoT B2 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH18602）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
243.638	-83.10	0.37	5.31	-78.16	H
737.120	-85.41	0.67	6.81	-79.27	H
1256.800	-74.13	0.89	7.57	-67.45	V
4922.000	-71.70	1.92	9.46	-64.16	V
6442.400	-70.83	2.33	11.19	-61.97	V
9701.600	-69.20	3.19	12.77	-59.62	V

NB-IoT B2 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH18900）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
241.640	-76.90	0.37	-0.77	-78.04	H
741.760	-77.53	0.67	0.81	-77.39	H
1299.000	-67.09	0.91	1.01	-66.99	V
4931.200	-71.56	1.92	9.46	-64.02	V
7714.000	-69.73	2.63	11.47	-60.89	V
10192.000	-68.97	3.45	13.07	-59.35	V

NB-IoT B2 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH19198）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
240.012	-83.13	0.37	5.23	-78.27	H
732.000	-85.80	0.66	7.00	-79.46	H
1302.00	-73.48	0.91	7.01	-67.38	V
4884.400	-71.66	1.95	9.46	-64.15	V
6546.000	-70.80	2.44	11.16	-62.08	V
10180.000	-68.96	3.41	13.07	-59.30	V

NB-IoT B4 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH19952）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
137.078	-87.42	0.27	4.76	-82.93	V
244.008	-83.54	0.37	5.31	-78.60	H
1271.000	-74.57	0.89	7.57	-67.89	V
4926.800	-72.59	1.92	9.46	-65.05	V
6493.200	-70.45	2.36	11.16	-61.65	V
9382.800	-69.01	3.26	12.27	-60.00	V

NB-IoT B4 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH20175）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
237.570	-84.03	0.37	5.35	-79.05	H
900.832	-83.28	0.74	7.11	-76.91	V
1431.400	-73.09	0.95	7.76	-66.28	H
4926.800	-72.22	1.92	9.46	-64.68	V
7756.000	-70.12	2.59	11.69	-61.02	V
10175.600	-68.96	3.41	13.07	-59.30	V

NB-IoT B4 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH20338）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
243.046	-83.03	0.37	5.31	-78.09	H
741.680	-85.86	0.67	6.81	-79.72	H
2449.600	-64.42	1.27	6.31	-59.38	H
4926.000	-72.21	1.92	9.46	-64.67	V
6484.400	-70.67	2.36	11.16	-61.87	V
10202.400	-68.05	3.89	13.07	-58.87	V

NB-IoT B12 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH23012）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
246.154	-82.59	0.37	5.31	-77.65	H
1194.400	-74.23	0.86	7.71	-67.38	H
1873.600	-68.49	1.10	6.57	-63.02	H
4412.400	-72.34	1.78	9.07	-65.05	V
6484.000	-70.78	2.36	11.16	-61.98	V
10207.600	-68.38	3.89	13.07	-59.20	V

NB-IoT B12 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH23095）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
241.862	-82.87	0.37	5.23	-78.01	H
736.240	-85.12	0.67	6.76	-79.03	H
1276.800	-73.61	0.89	7.01	-67.49	V
4922.400	-71.98	1.92	9.46	-64.44	V
8182.800	-68.91	2.74	11.71	-59.94	V
10222.400	-69.00	3.46	13.07	-59.39	V

NB-IoT B12 Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH23178）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
242.158	-81.56	0.37	5.23	-76.70	H
1100.200	-73.50	0.83	6.76	-67.57	V
1871.000	-68.56	1.10	6.57	-63.09	H
4922.400	-72.28	1.92	9.46	-64.74	V
6462.000	-70.45	2.39	11.16	-61.68	V
10178.400	-68.89	3.41	13.07	-59.23	V

NB-IoT B13 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH23182）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
240.900	-83.47	0.37	5.23	-78.61	H
664.160	-88.05	0.64	7.09	-81.60	V
1279.600	-73.61	0.89	7.01	-67.49	V
4911.200	-72.37	1.95	9.46	-64.86	V
6493.600	-70.47	2.42	11.16	-61.73	V
9393.200	-68.45	3.45	12.27	-59.63	V

NB-IoT B13 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH23230）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
244.304	-82.67	0.37	5.31	-77.73	H
1287.600	-73.71	0.90	7.01	-67.60	V
1945.000	-68.98	1.13	6.83	-63.28	H
4932.400	-72.32	1.92	9.46	-64.78	V
6488.800	-73.20	2.36	11.16	-64.40	V
10212.400	-68.46	3.89	13.07	-59.28	V

NB-IoT B13 Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH23278）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
242.158	-83.56	0.37	5.23	-78.70	H
680.000	-87.42	0.64	7.08	-80.98	V
1293.400	-73.77	0.91	7.01	-67.67	V
4930.400	-72.20	1.92	9.46	-64.66	V
6464.400	-70.33	2.39	11.16	-61.56	V
9426.000	-68.17	3.41	12.27	-59.31	V

NB-IoT B26 (814MHz-824MHz) Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH26692）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
241.936	-75.64	0.37	5.23	-70.78	H
1194.200	-67.06	0.86	7.71	-60.21	H
2164.200	-59.79	1.20	6.68	-54.31	V
4940.800	-70.36	1.93	9.46	-62.83	V
6473.200	-69.82	2.36	11.16	-61.02	V
9373.200	-68.02	3.22	12.27	-58.97	V

NB-IoT B26 (814MHz-824MHz)Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH26740）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
241.344	-82.86	0.37	5.23	-78.00	H
722.960	-84.29	0.66	7.28	-77.67	H
1297.800	-73.40	0.91	7.01	-67.30	V
4920.400	-70.70	1.92	9.46	-63.16	V
6520.800	-70.27	2.40	11.16	-61.51	V
9385.600	-68.24	3.45	12.27	-59.42	V

NB-IoT B26 (814MHz-824MHz)Radiated Spurious Emission Results

Test Data （15K bandwidth BPSK Mode CH26788）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
246.006	-83.55	0.37	5.31	-78.61	H
1266.000	-74.27	0.88	7.57	-67.58	V
2000.000	-69.29	1.14	7.55	-62.88	V
4928.000	-71.64	1.92	9.46	-64.10	V
6484.400	-70.41	2.36	11.16	-61.61	V
9464.800	-68.21	3.38	12.41	-59.18	V

NB-IoT B26 (824MHz-849MHz)Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH26792）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
242.824	-76.02	0.37	5.31	-71.08	H
1241.900	-67.69	0.88	7.57	-61.00	V
2153.100	-60.00	1.20	6.68	-54.52	H
4339.200	-71.37	1.76	8.76	-64.37	V
6525.600	-70.20	2.37	11.16	-61.41	V
9399.200	-68.22	3.28	12.27	-59.23	V

NB-IoT B26 (824MHz-849MHz)Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH26915）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
244.156	-76.01	0.37	5.31	-71.07	H
579.040	-81.71	0.59	7.00	-75.30	V
1506.000	-65.37	0.97	7.45	-58.89	H
4920.400	-70.82	1.92	9.46	-63.28	V
6462.800	-69.80	2.39	11.16	-61.03	V
9371.200	-68.43	3.22	12.27	-59.38	V

NB-IoT B26 (824MHz-849MHz)Radiated Spurious Emission Results

Test Data （3.75K bandwidth BPSK Mode CH27038）

Frequency [MHz]	Generator output power(Pg) [dBm]	Cable loss [dB]	Antenna Gain [dB]	Spurious Emission Power (Pd) [dBm]	Antenna Polarization [H/V]
242.306	-74.20	0.37	5.23	-69.34	H
1274.400	-67.79	0.89	7.57	-61.11	V
1979.400	-61.73	1.13	7.55	-55.31	H
4321.200	-70.68	1.80	8.76	-63.72	V
6486.800	-69.81	2.36	11.16	-61.01	V
9423.600	-68.36	3.30	12.27	-59.39	V

6.6. Band Edge

Specifications:	FCC Part 2.1051,24.238, 2.1053, 22.917, 27.53,90.691
DUT Serial Number:	866884049909625
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

According to Part 22.917 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to Part 24.238 (a), i.e., Out of Band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB, so the limit level is: P(dBm)– (43 + 10 log(P)) dB= -13dBm.

According to Part 27.53(c):

On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

According to Part 27.53(f):

For operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

According to Part 27.53(h):

Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 Bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10(P) dB.

According to Part 27.53(g):

For operations in the 600 MHz Band and the 698-746 MHz Band, the power of any emission outside a licensee's frequency Band(s) of operation shall be attenuated below the transmitter power (P) within the licensed Band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution Bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz Bands immediately outside and adjacent to a licensee's frequency block, a resolution Bandwidth of at least 30 kHz may be employed.

According to Part 90.691:

(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

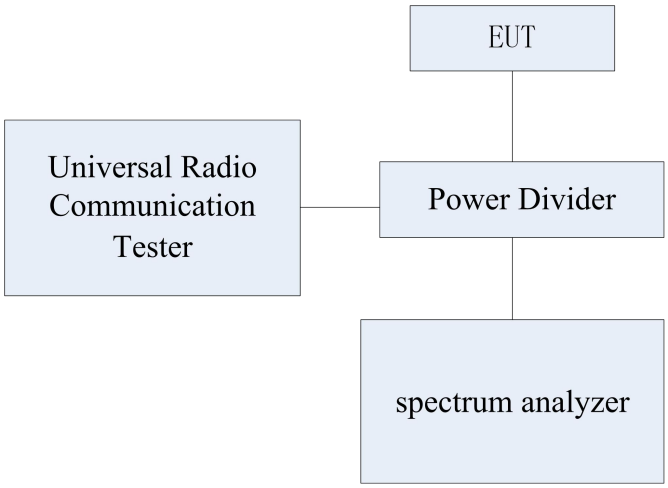
(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

Measurement Uncertainty:

Item	Uncertainty	
Expanded Uncertainty	9kHz < f≤4GHz	0.71 dB (k=2)
	4GHz≤f < 12.75GHz	0.74 dB (k=2)
	12.75GHz≤f < 26GHz	2.70 dB (k=2)

Test Setup:

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Test Method:

1) The EUT was coupled to the EMI test receiver analyzer mode and the base station simulator through a power divider. The lost of the cables the test system is calibrated to correct the readings.

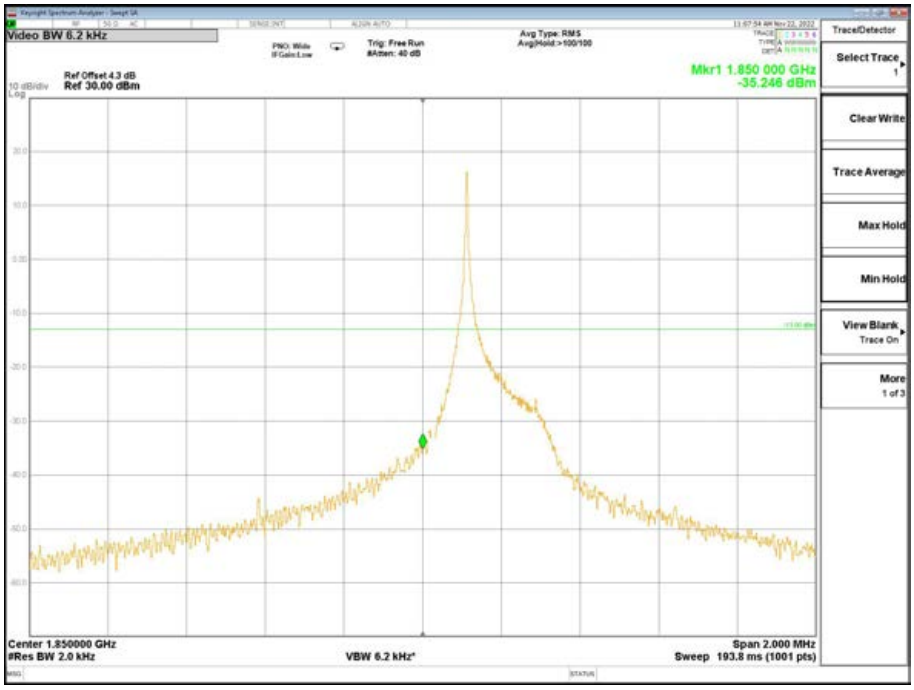
2) The spectrum analyzer was set to Average Detector function and Maximum hold mode.

3) The resolution Bandwidth of the spectrum analyzer was a little greater than 1% of the 26dB emission

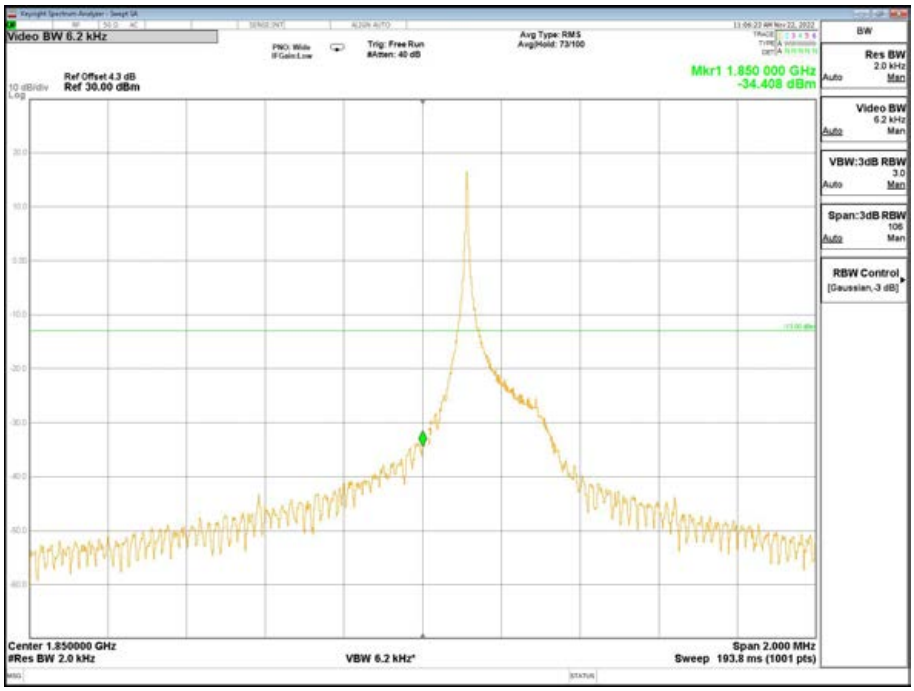
Bandwidth.

Note: In the graphical result description (X, Y), X represents the number of RB, Y represents the RB offset.

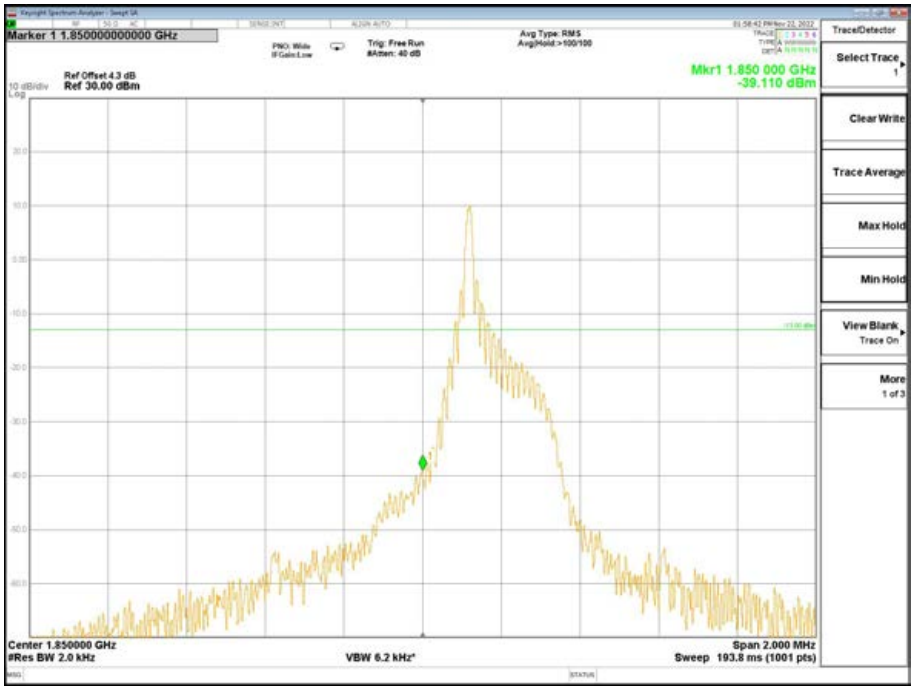
6.7.1 NB-IoT Band 2 Edge Results



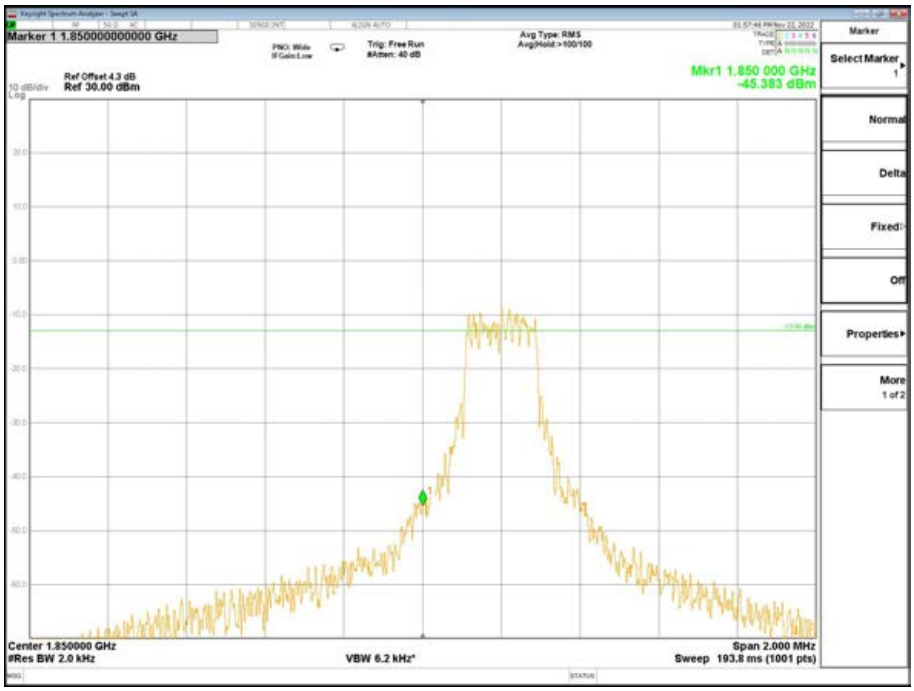
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0



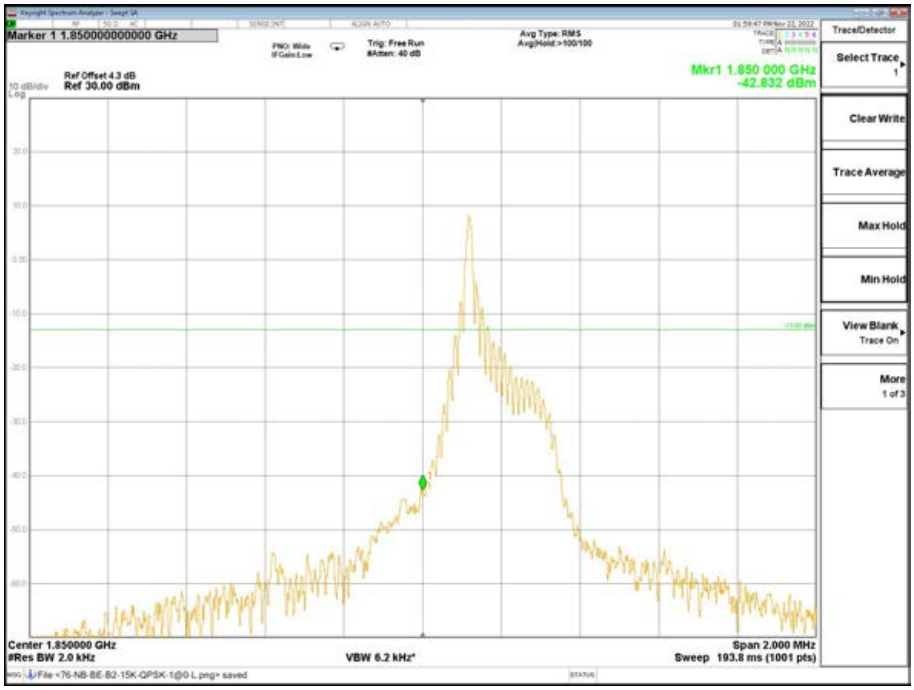
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0



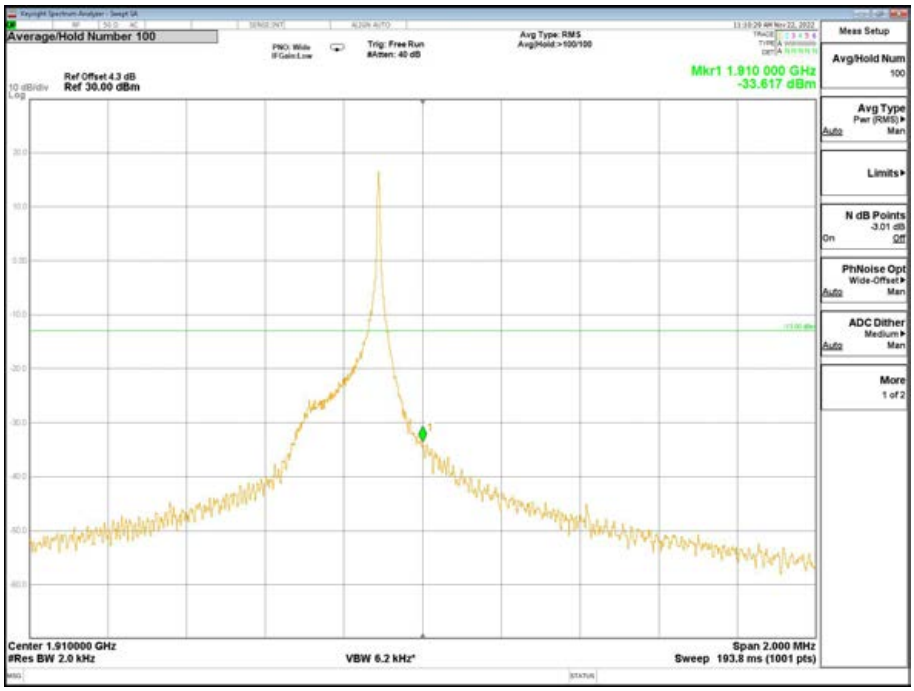
Low Channel, Subcarrier (15kHz), QPSK, 1@0



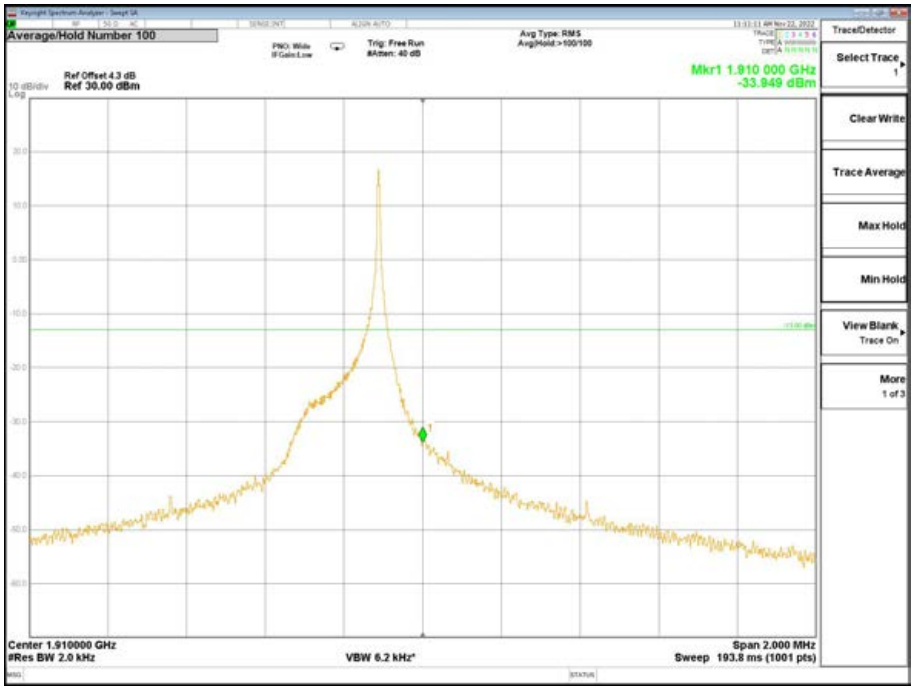
Low Channel, Subcarrier (15kHz), QPSK, 12@0



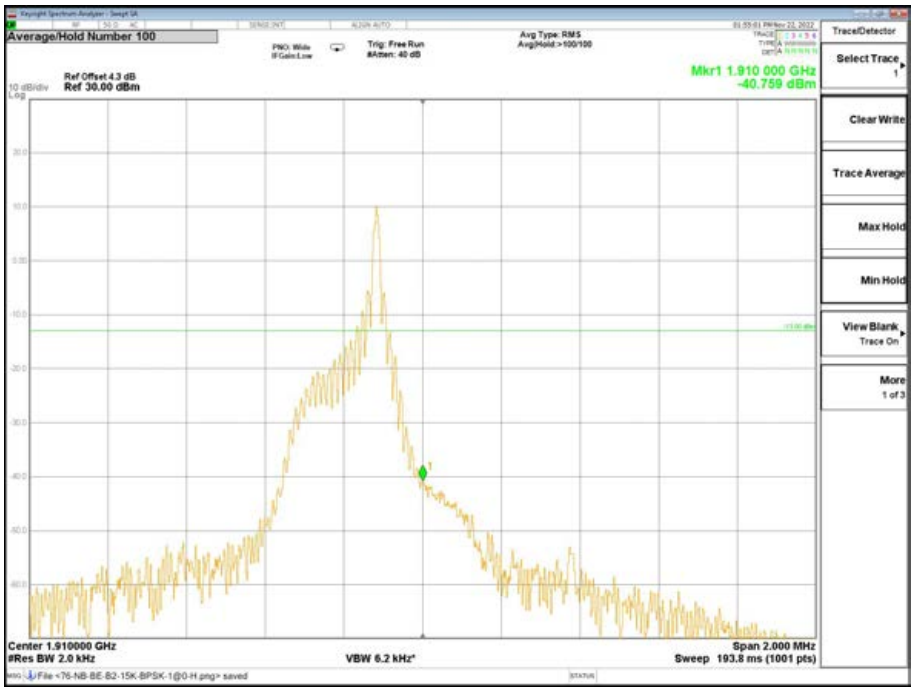
Low Channel, Subcarrier (15kHz), BPSK, 1@0



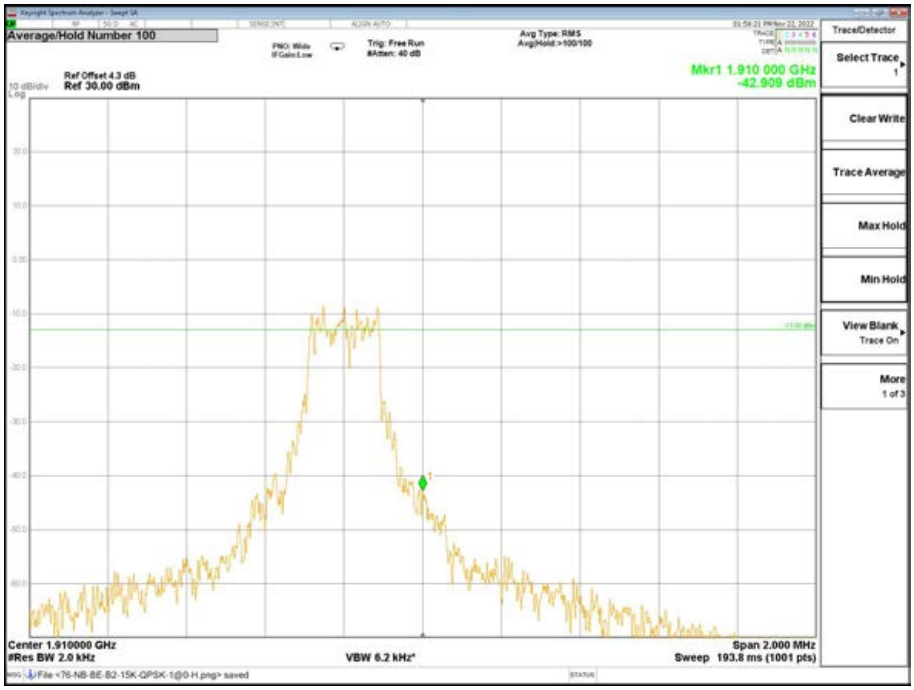
High Channel, Subcarrier (3.75kHz), QPSK, 1@47



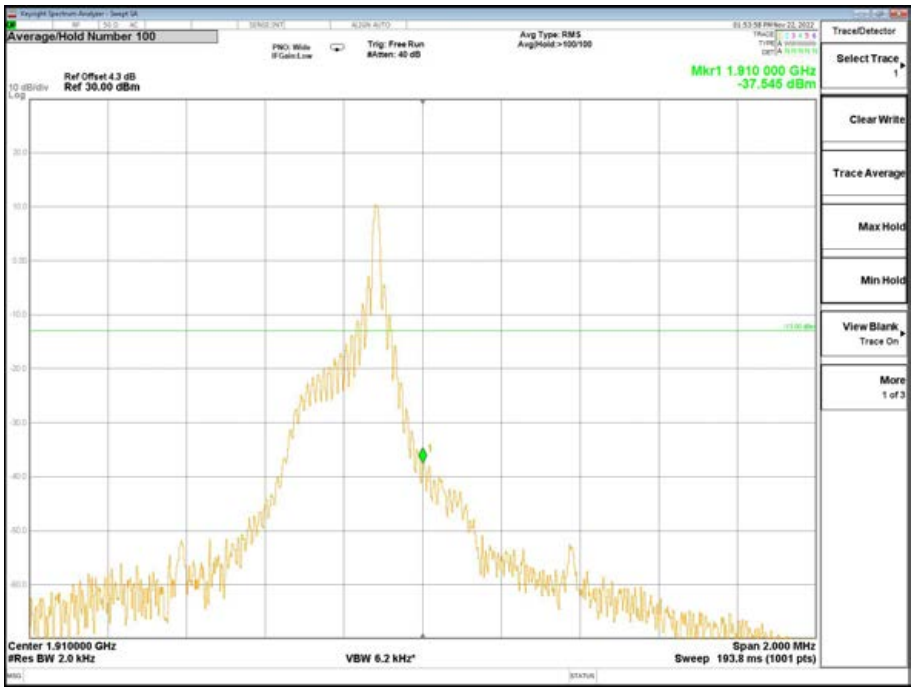
High Channel, Subcarrier (3.75kHz), BPSK, 1@47



High Channel, Subcarrier (15kHz), QPSK, 1@11

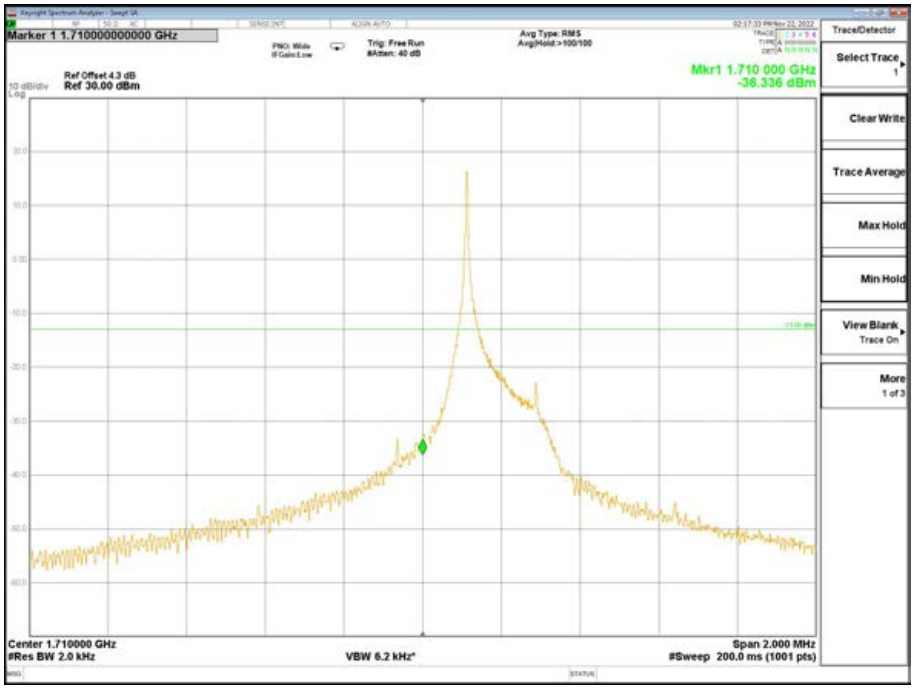


High Channel, Subcarrier (15kHz), QPSK, 12@0

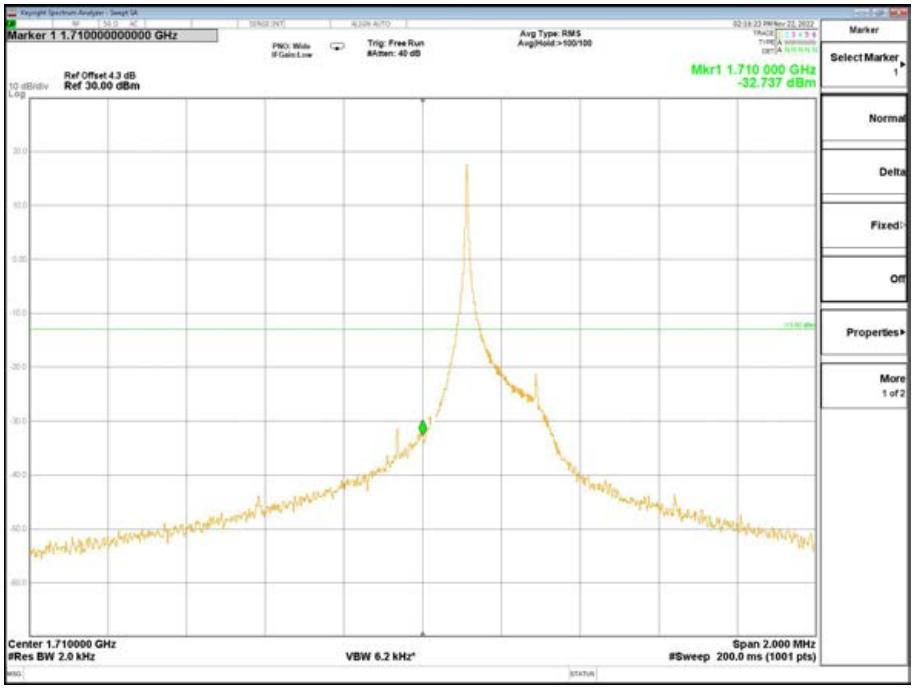


High Channel, Subcarrier (15kHz), BPSK, 1@11

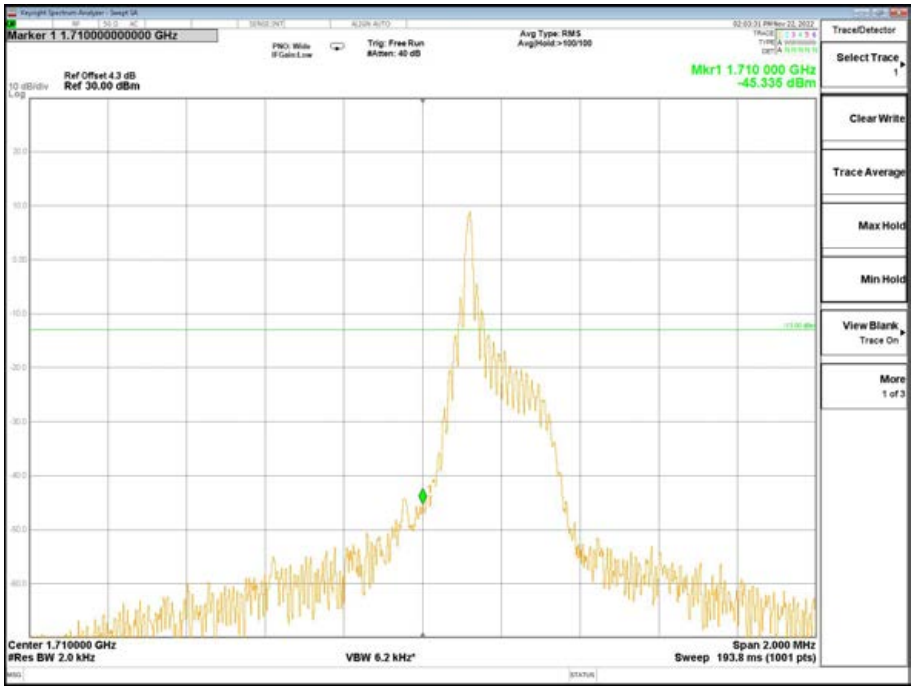
6.7.2 NB-IoT Band 4 Edge Results



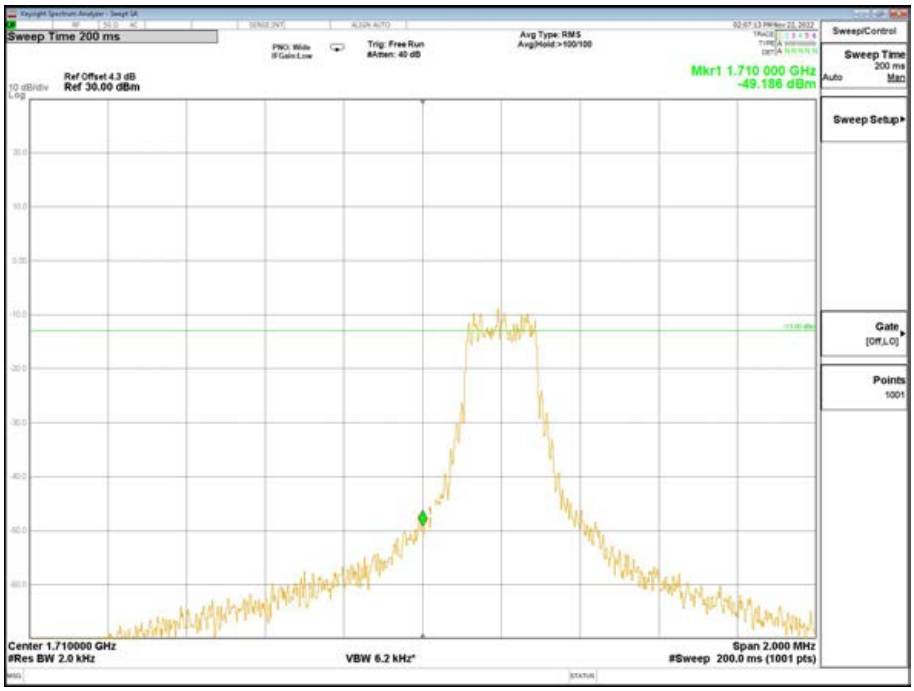
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0



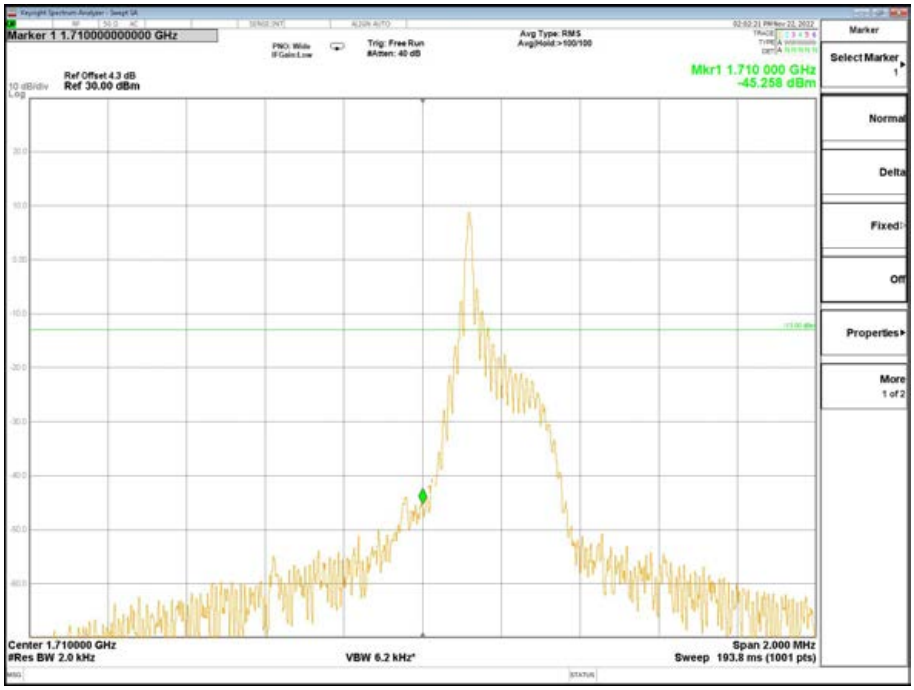
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0



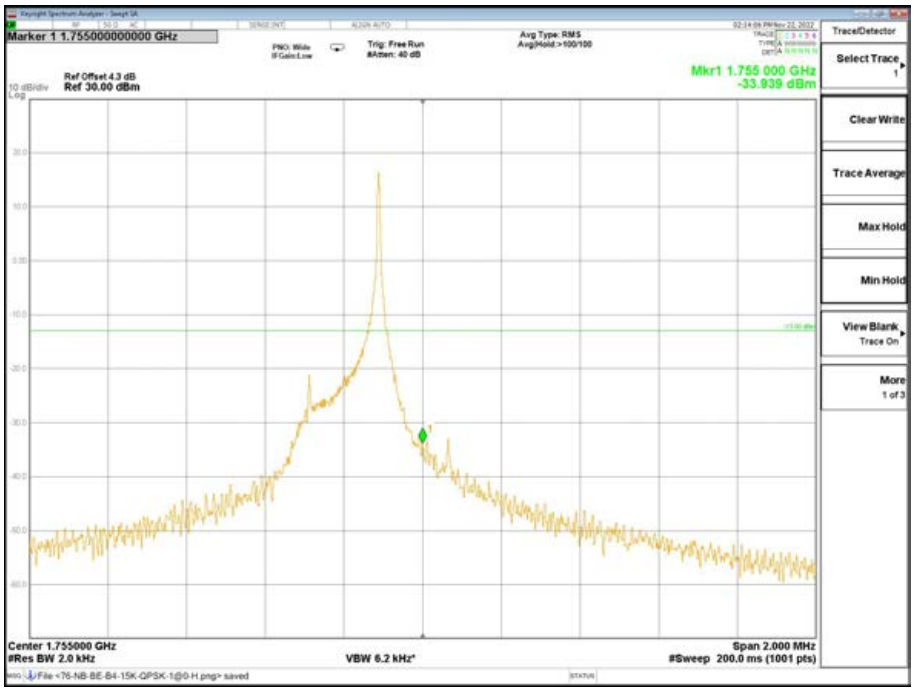
Low Channel, Subcarrier (15kHz), QPSK, 1@0



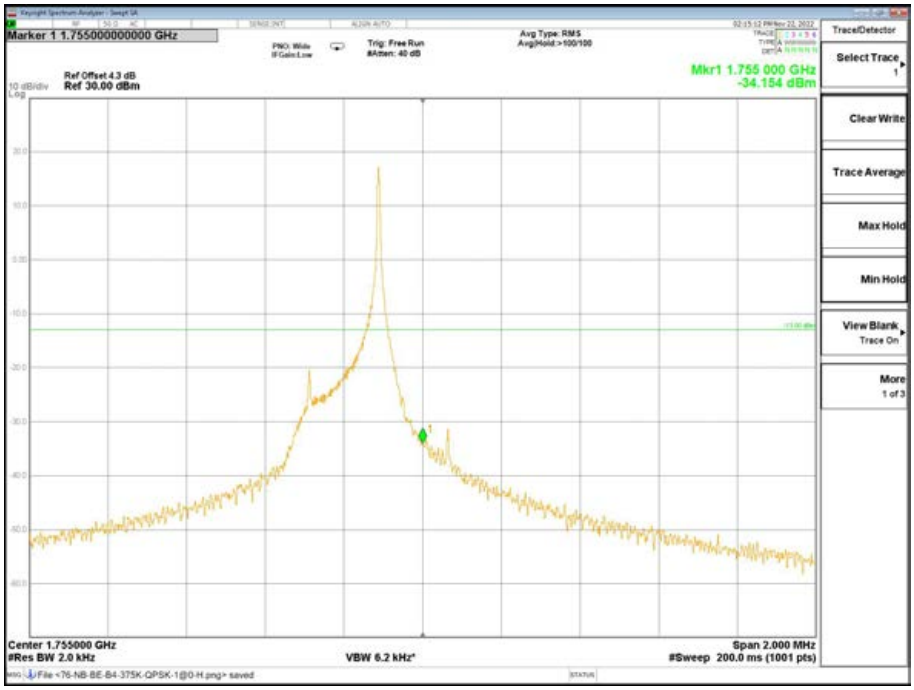
Low Channel, Subcarrier (15kHz), QPSK, 12@0



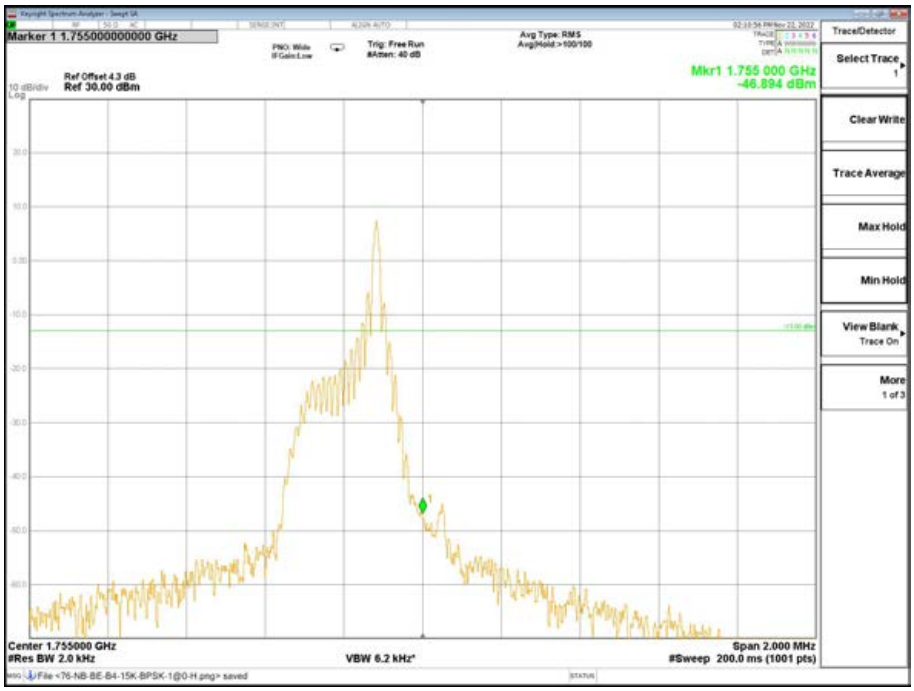
Low Channel, Subcarrier (15kHz), BPSK, 1@0



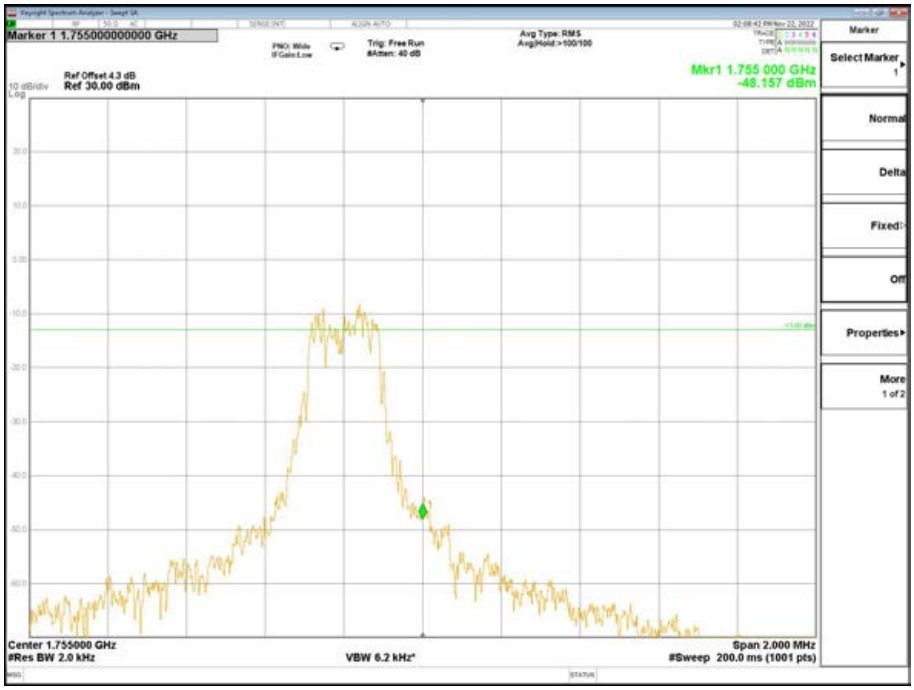
High Channel, Subcarrier (3.75kHz), QPSK, 1@47



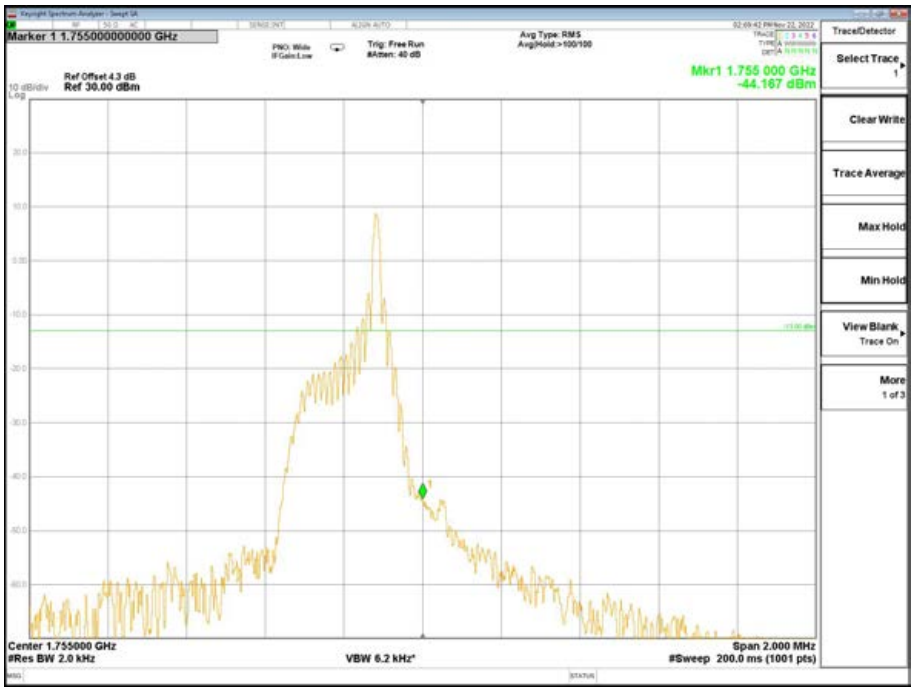
High Channel, Subcarrier (3.75kHz), BPSK, 1@47



High Channel, Subcarrier (15kHz), QPSK, 1@11

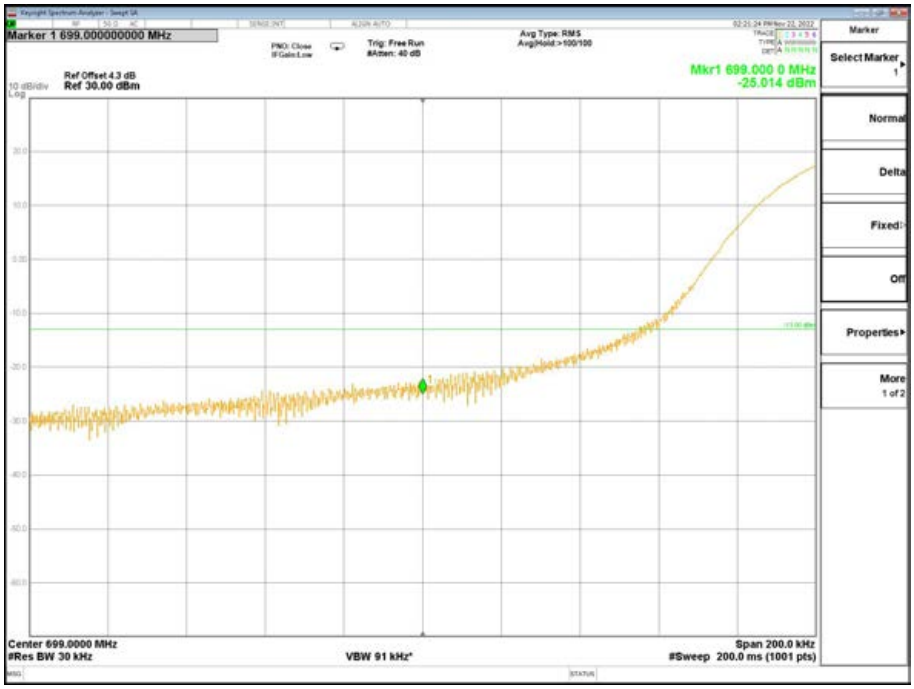


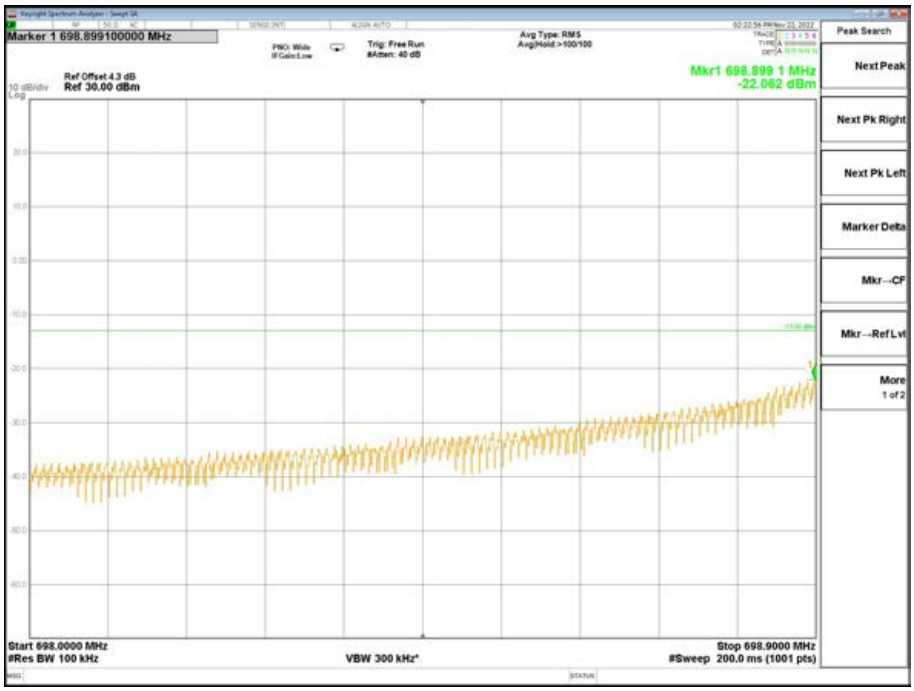
High Channel, Subcarrier (15kHz), QPSK, 12@0



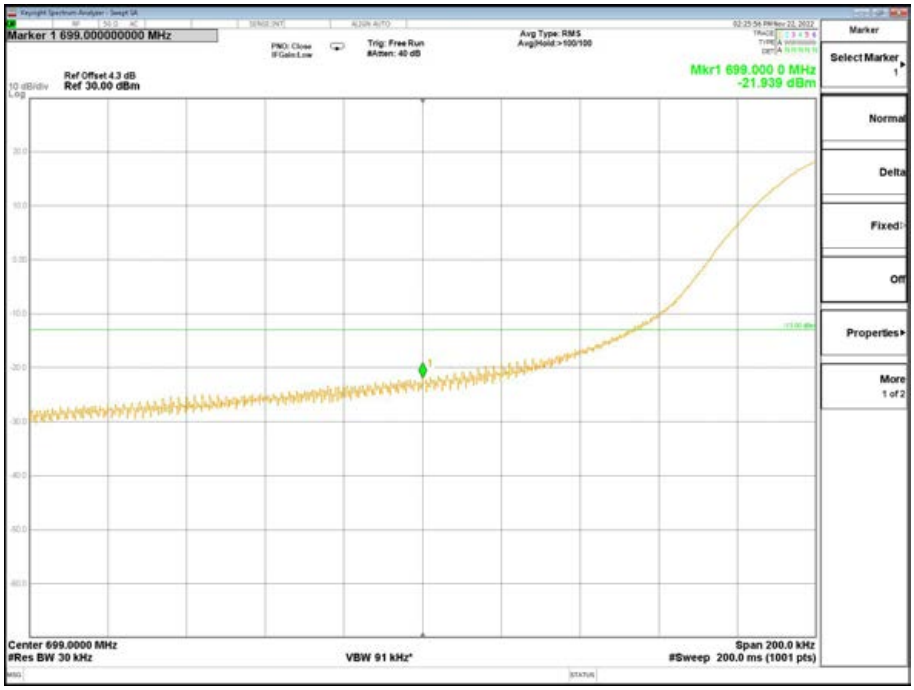
High Channel, Subcarrier (15kHz), BPSK, 1@11

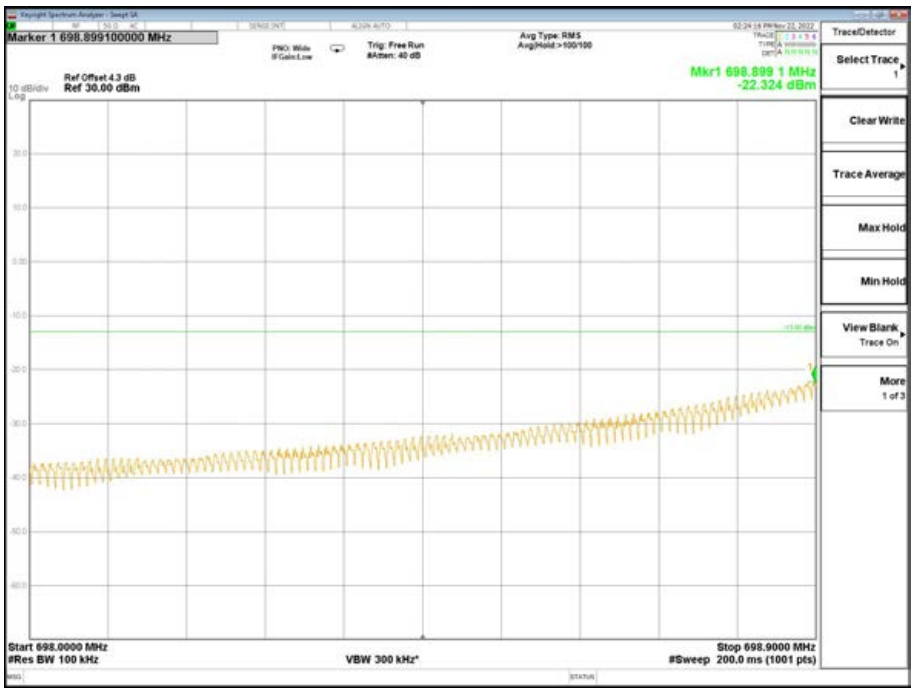
6.7.3 NB-IoT Band 12 Edge Results



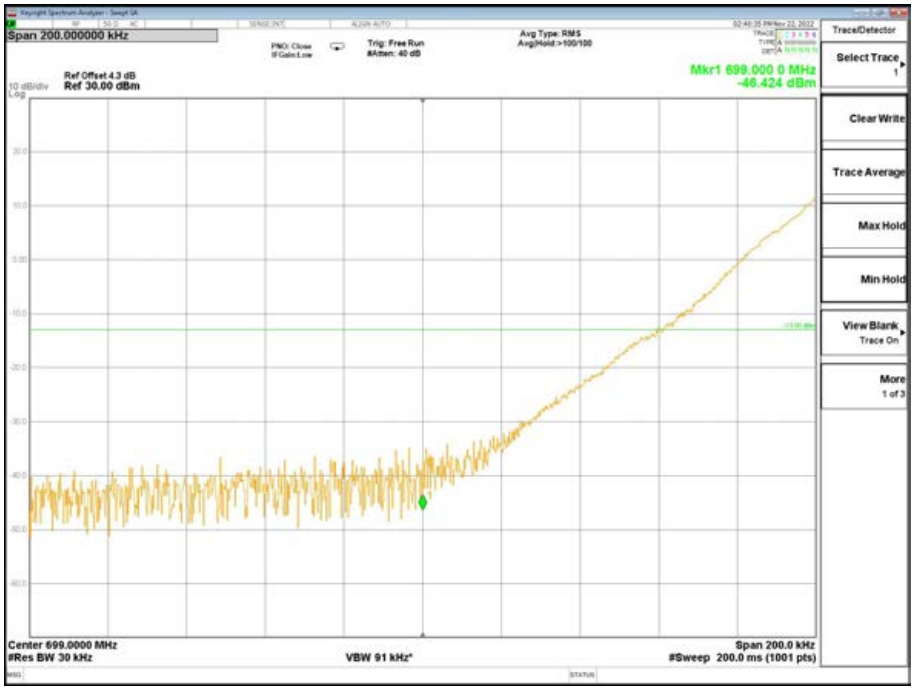


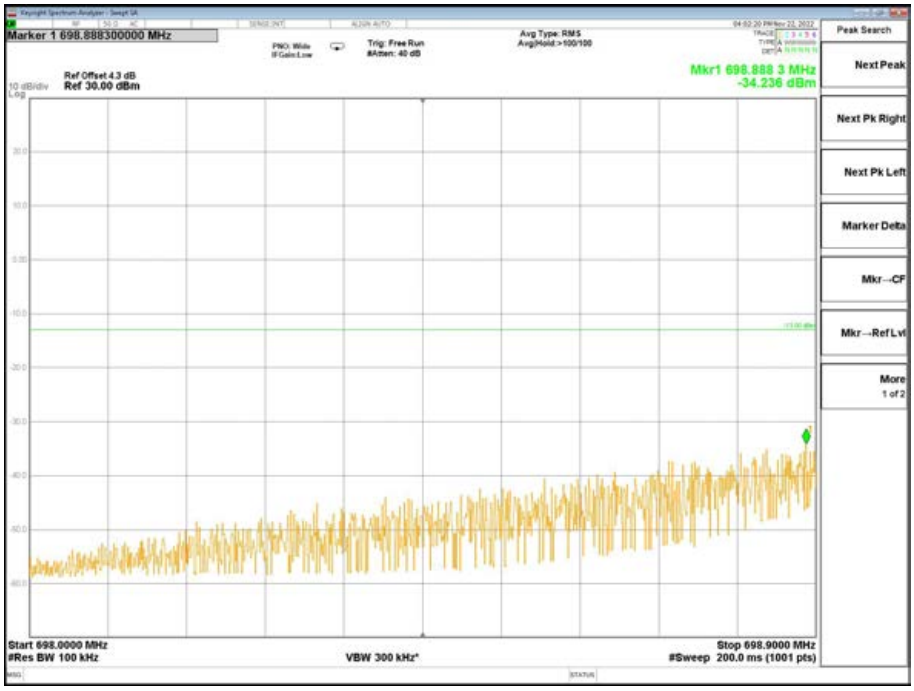
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0



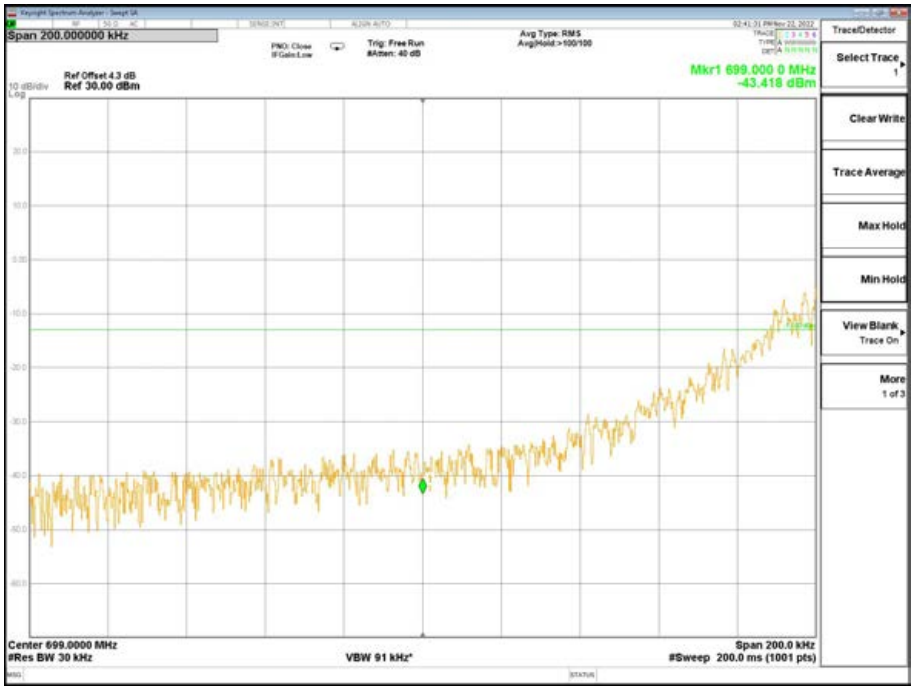


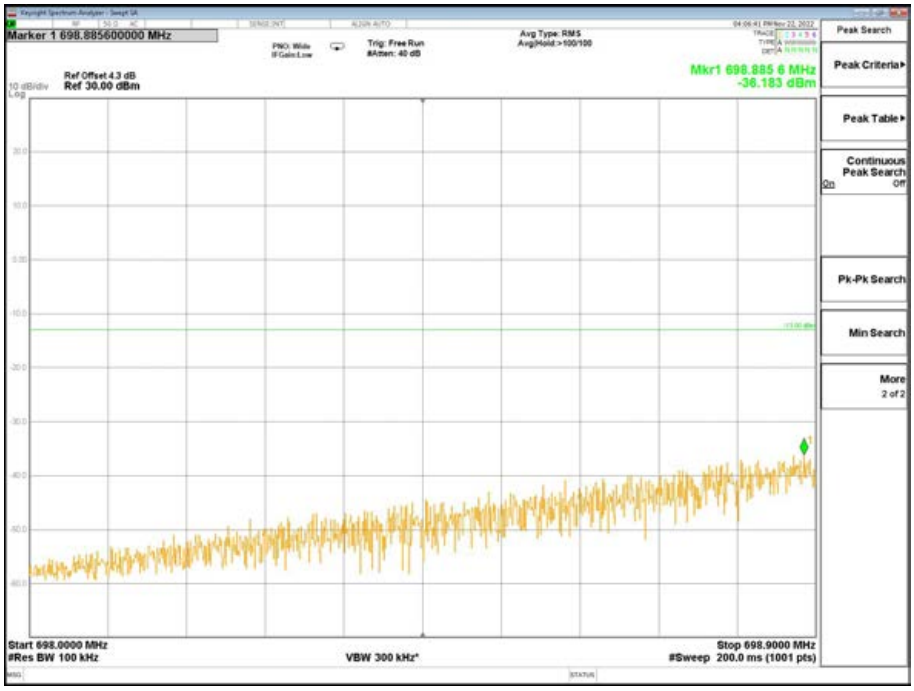
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0



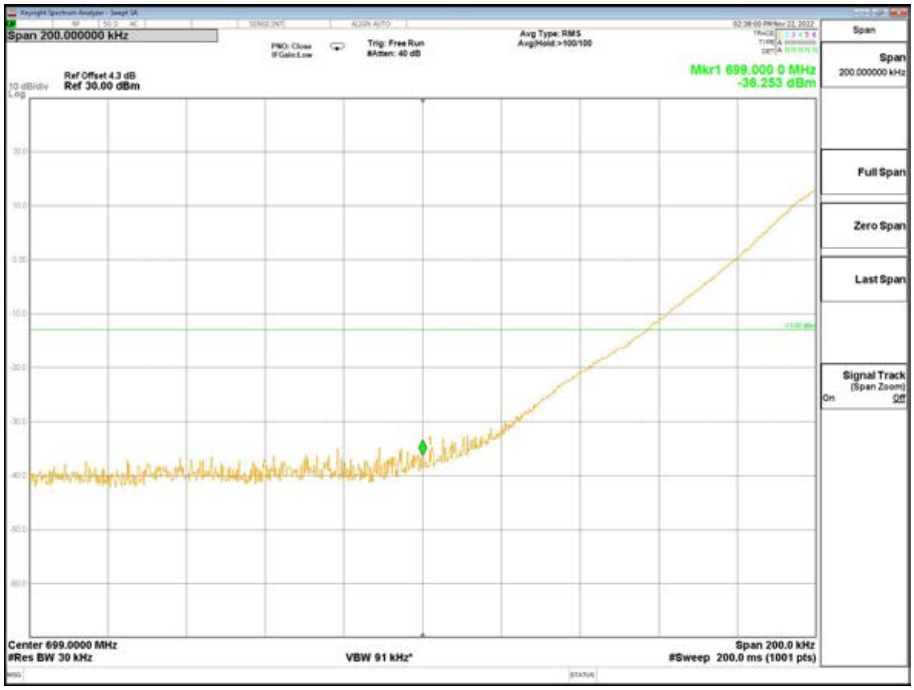


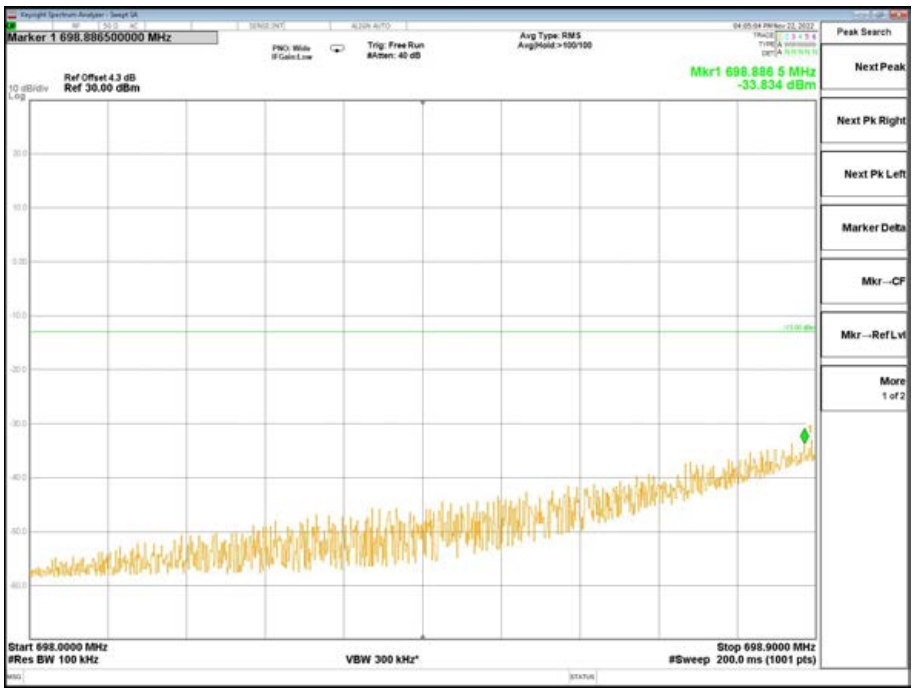
Low Channel, Subcarrier (15kHz), QPSK, 1@0



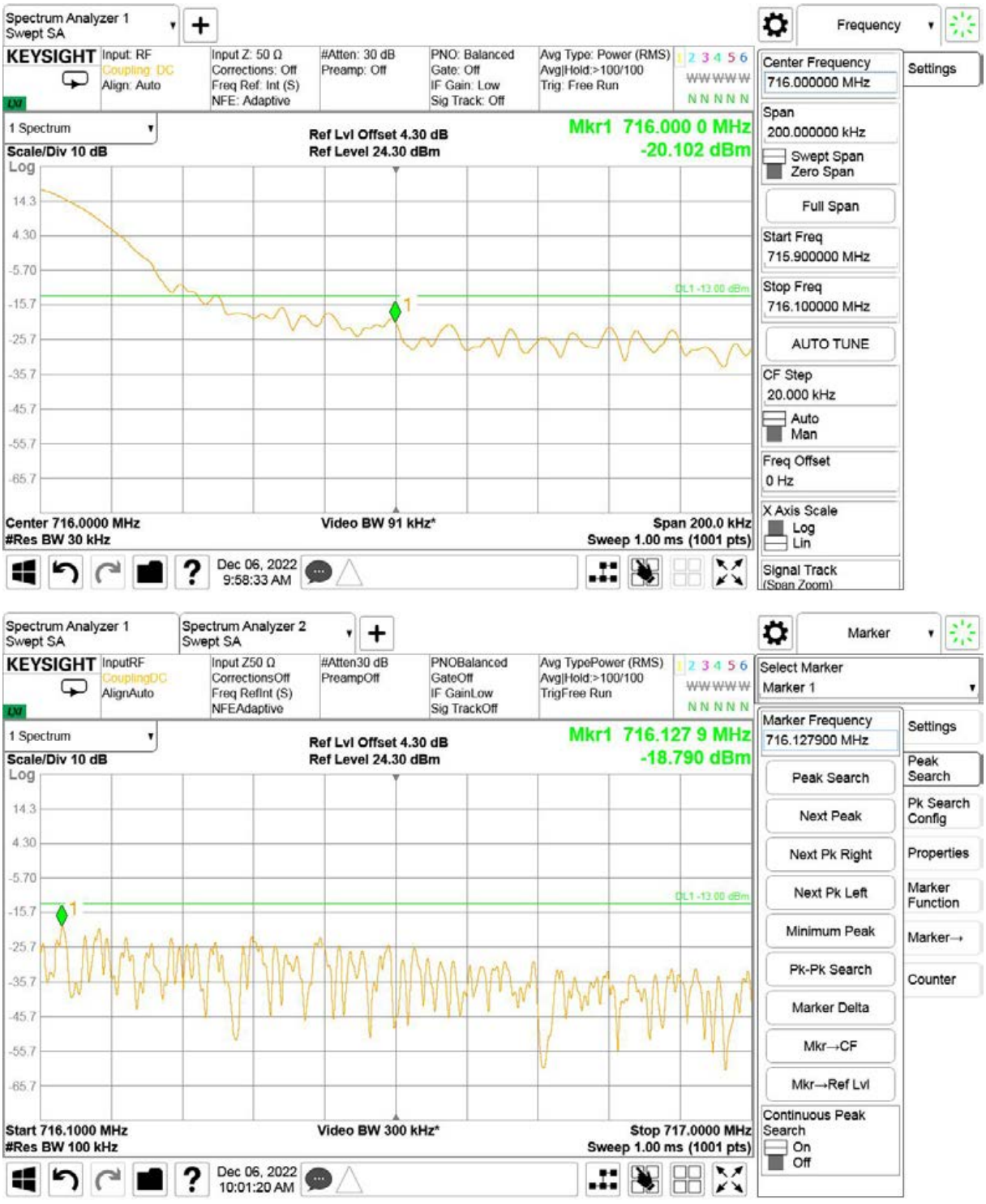


Low Channel, Subcarrier (15kHz), QPSK, 12@0

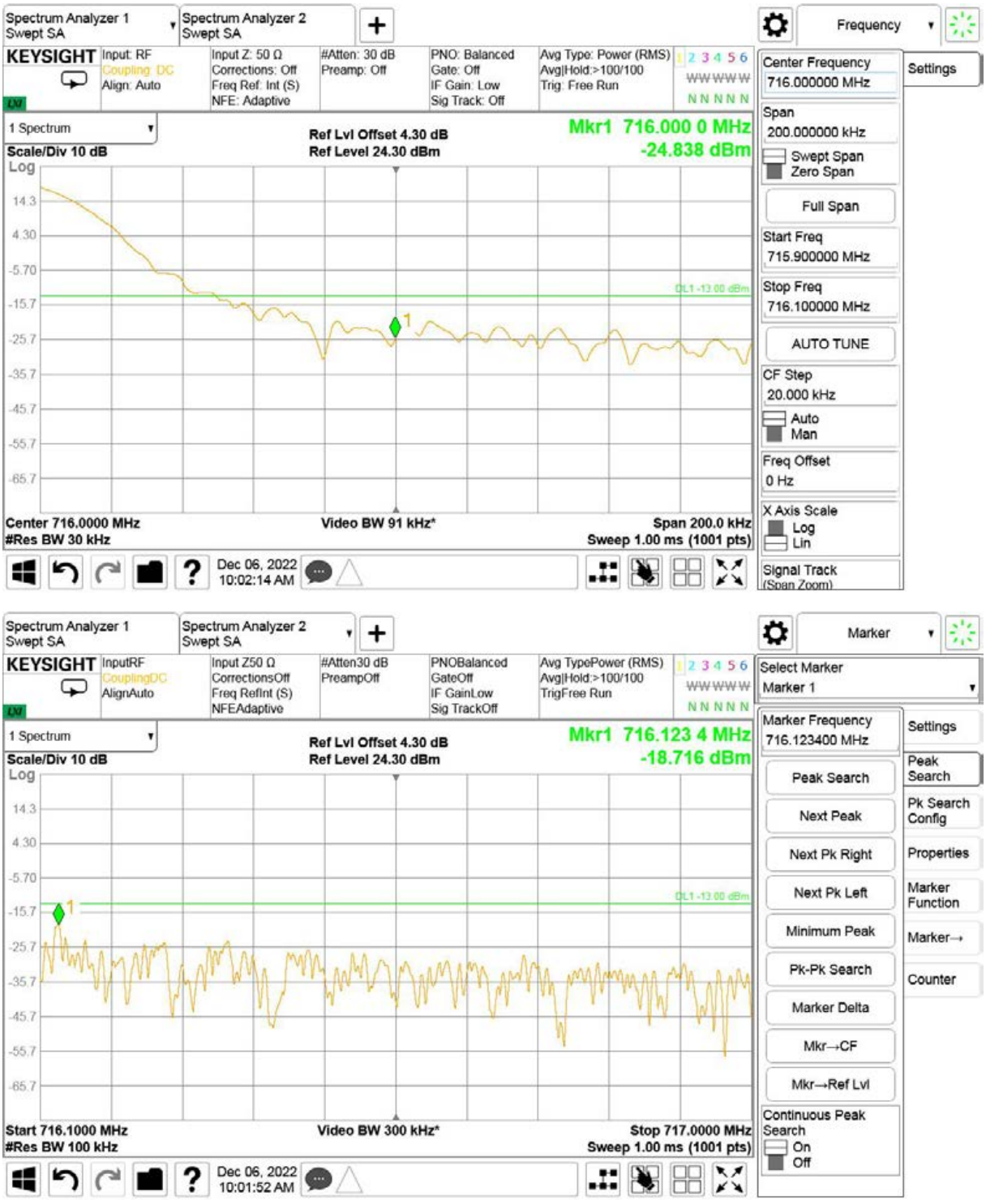




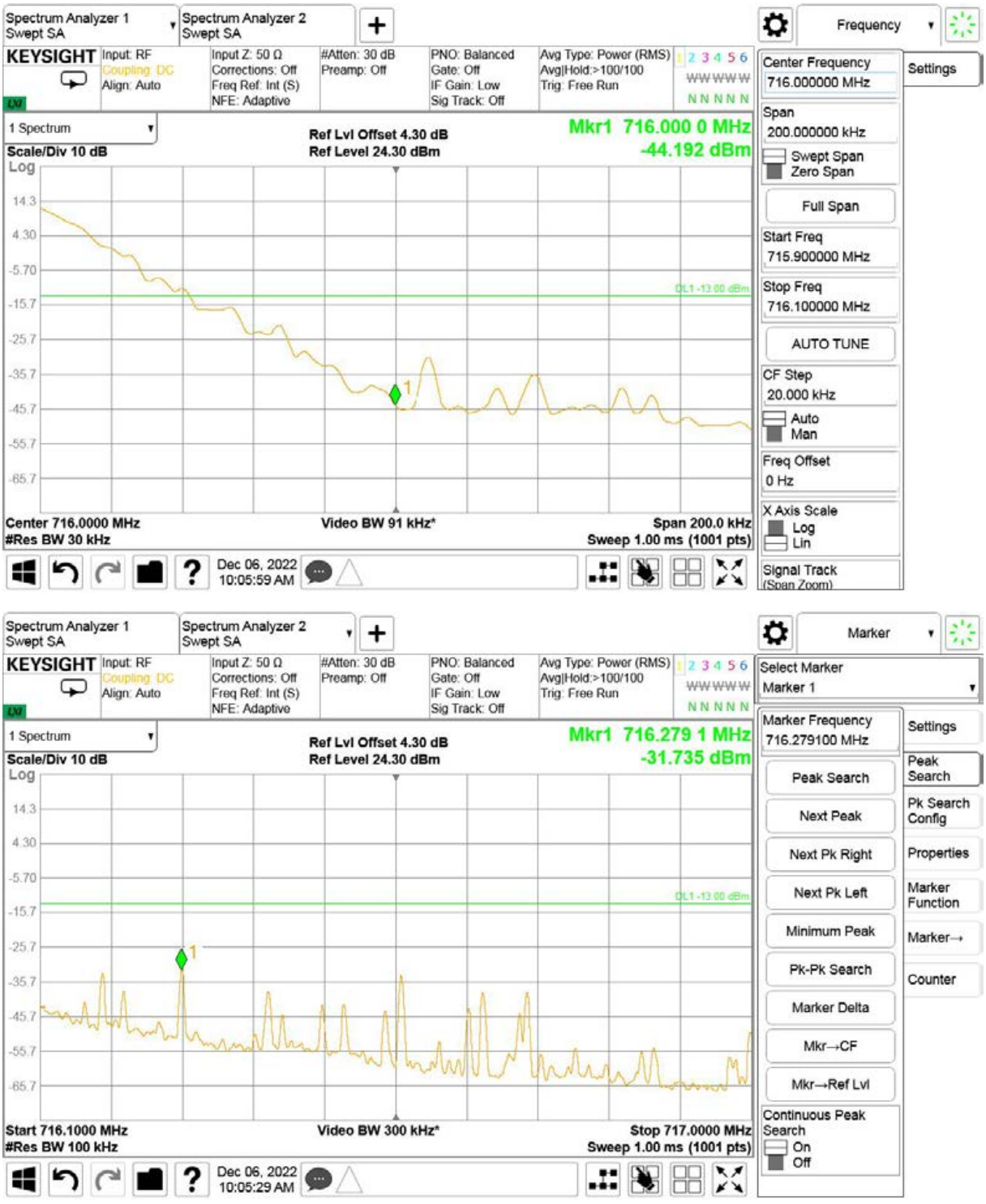
Low Channel, Subcarrier (15kHz), BPSK, 1@0



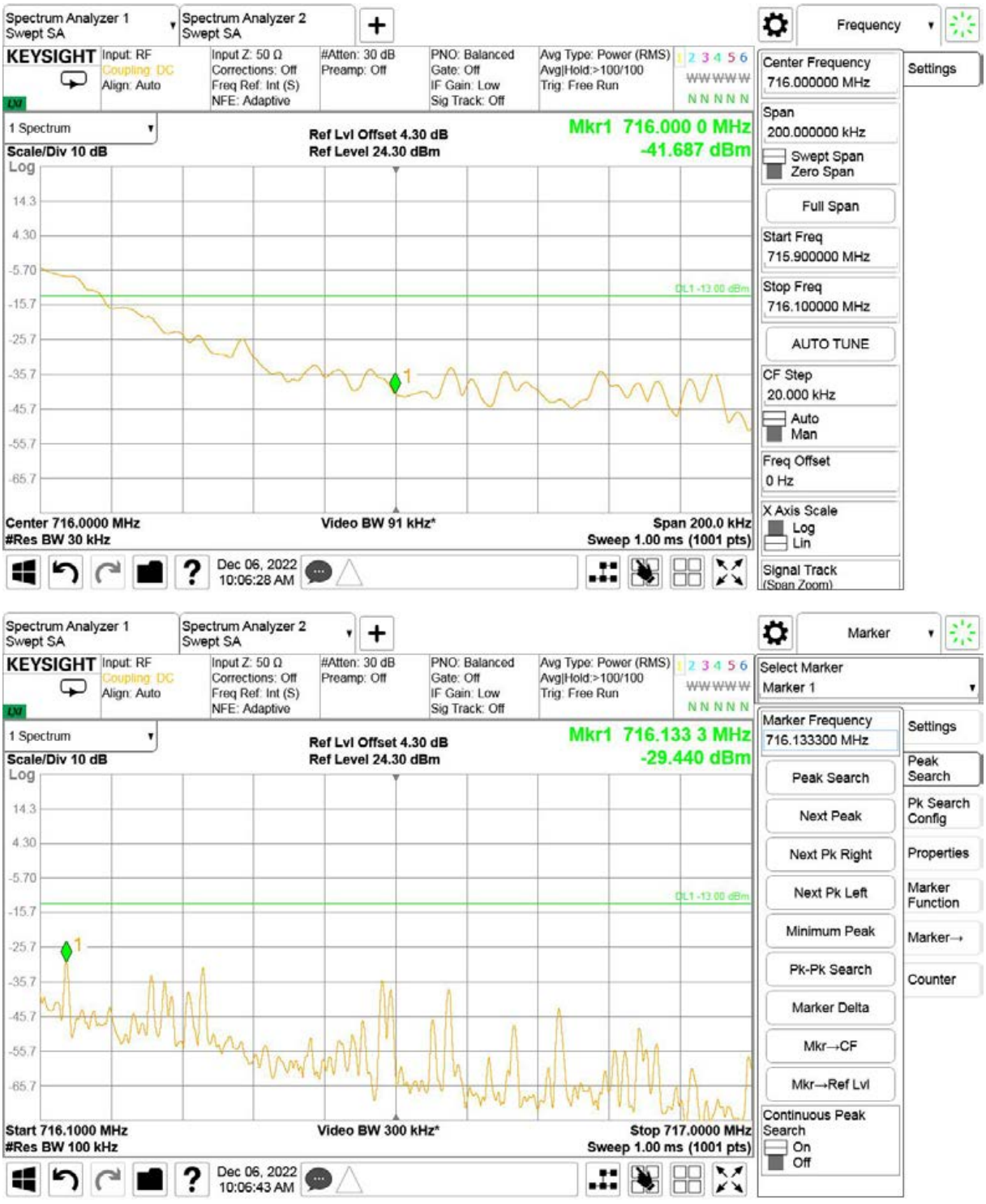
High Channel, Subcarrier (3.75kHz), QPSK, 1@47



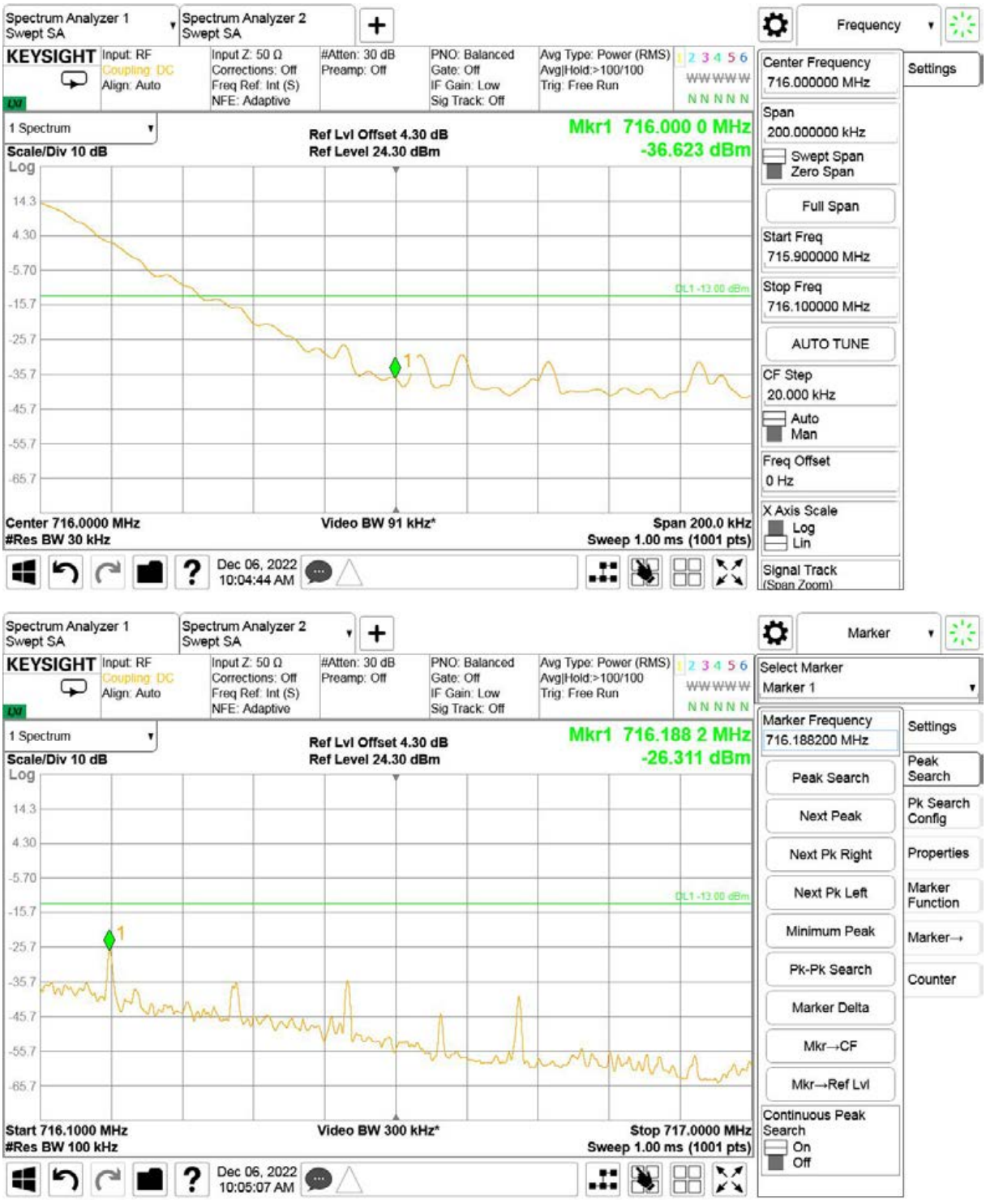
High Channel, Subcarrier (3.75kHz), BPSK, 1@47



High Channel, Subcarrier (15kHz), QPSK, 1@11



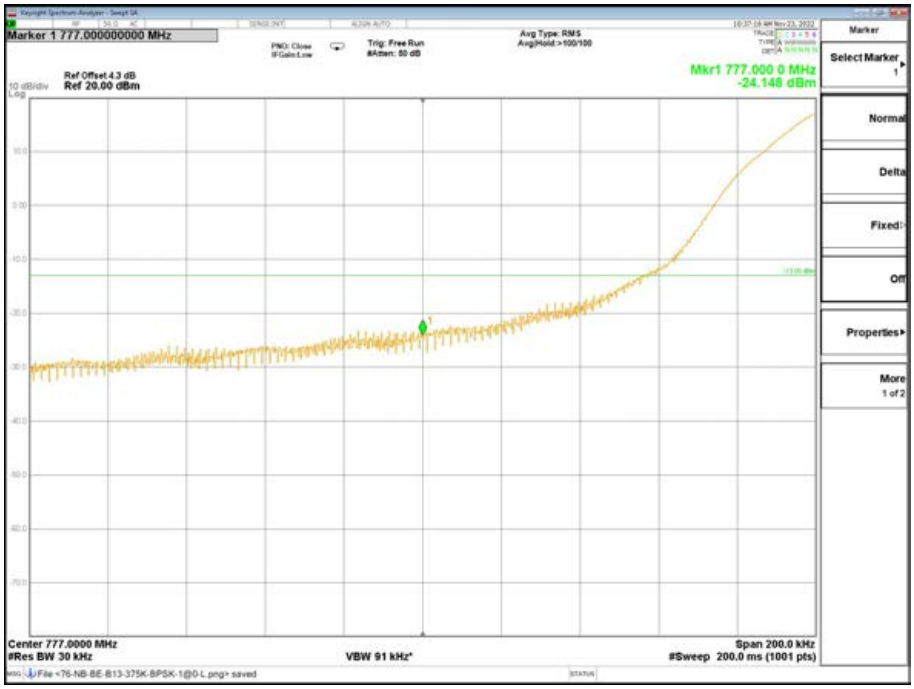
High Channel, Subcarrier (15kHz), QPSK, 12@0

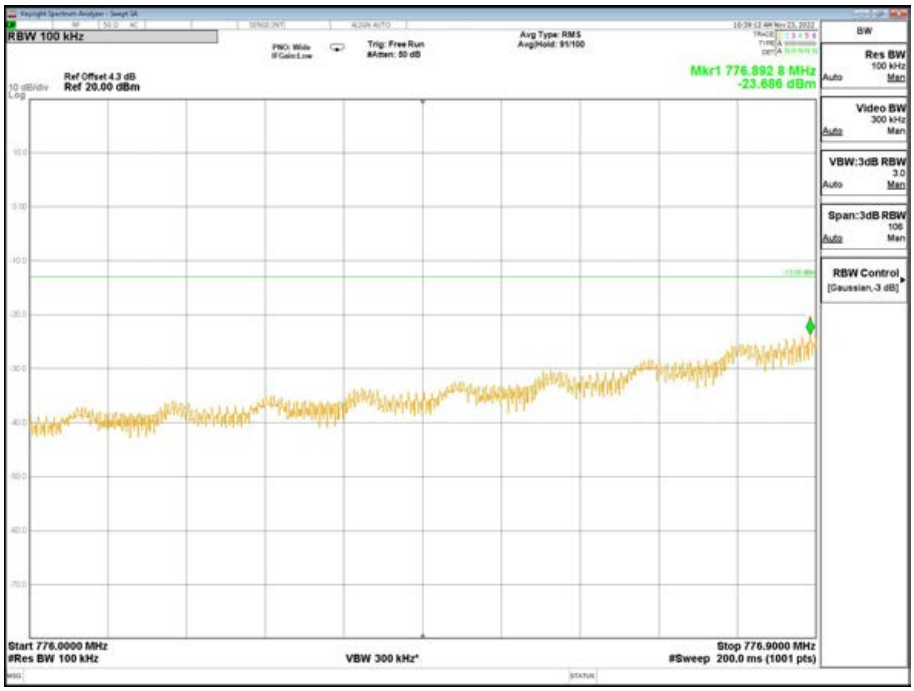


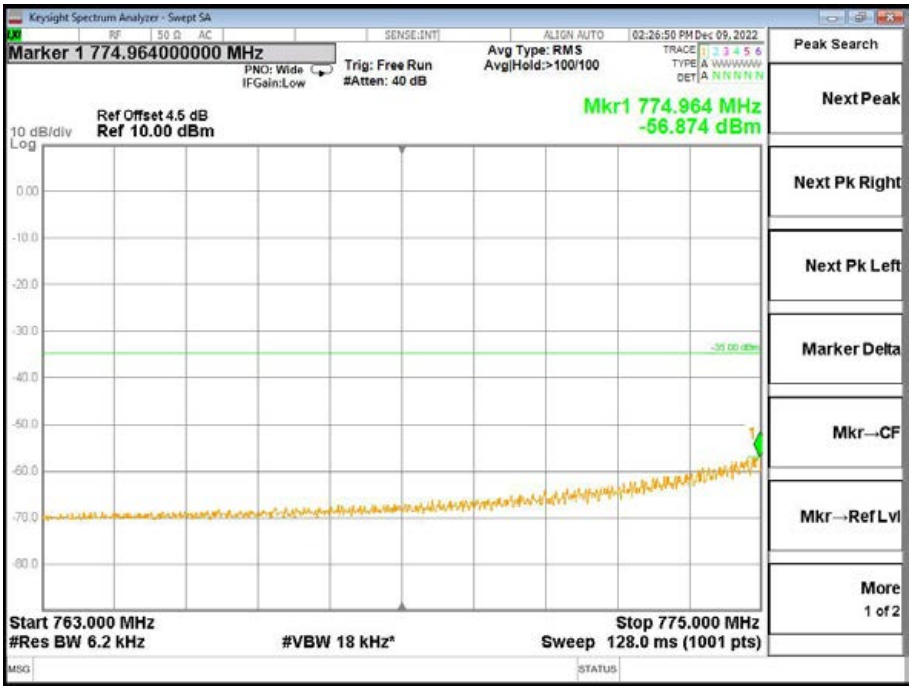
High Channel, Subcarrier (15kHz), BPSK, 1@11

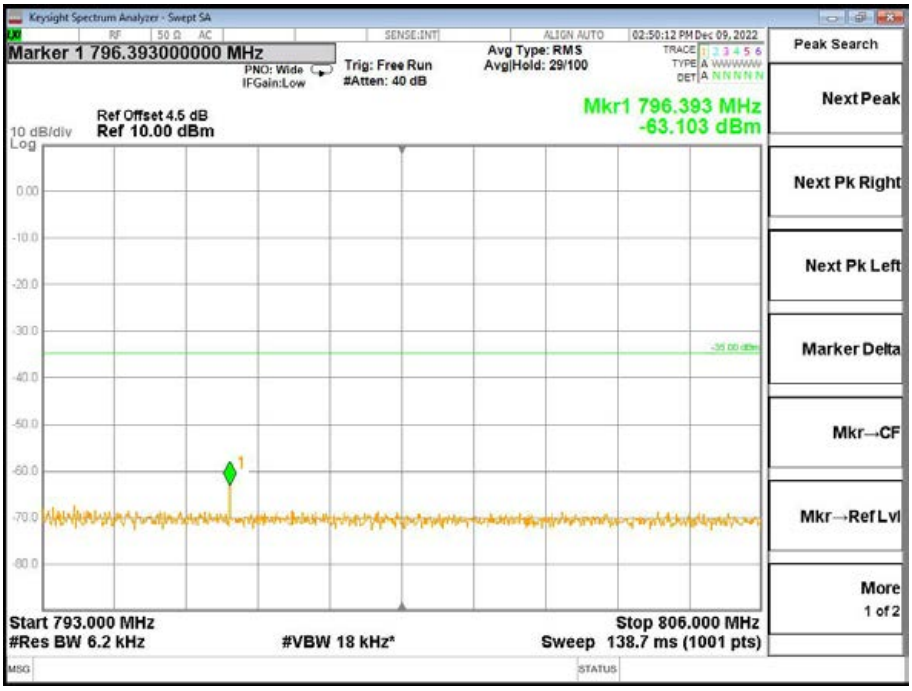
6.7.4 NB-IoT Band 13 Edge Results

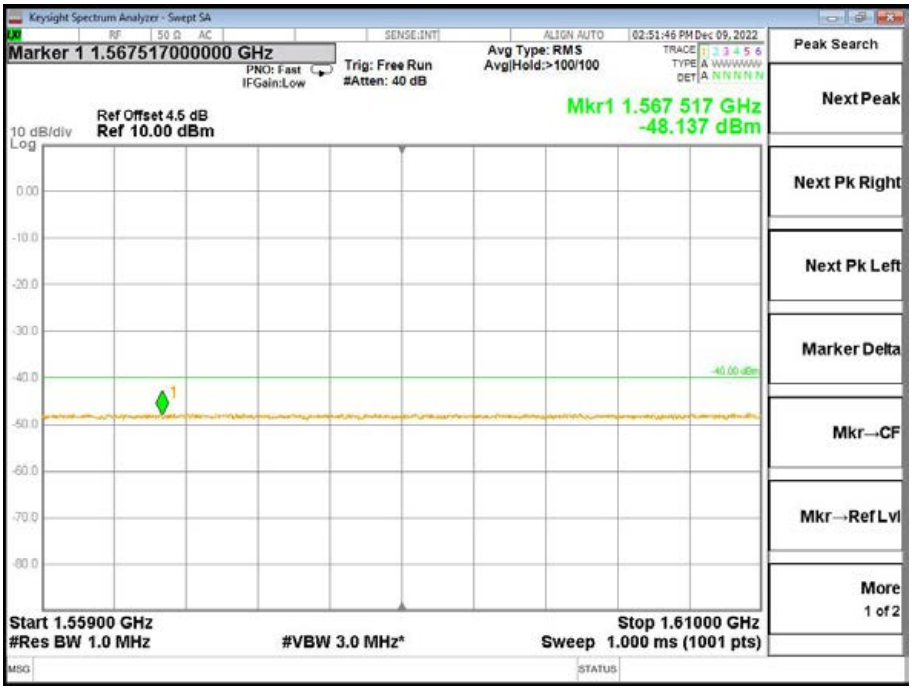
For the 1559-1610MHz test band， Since the bandwidth is greater than 700Hz, the limit requirement is -40dBm.





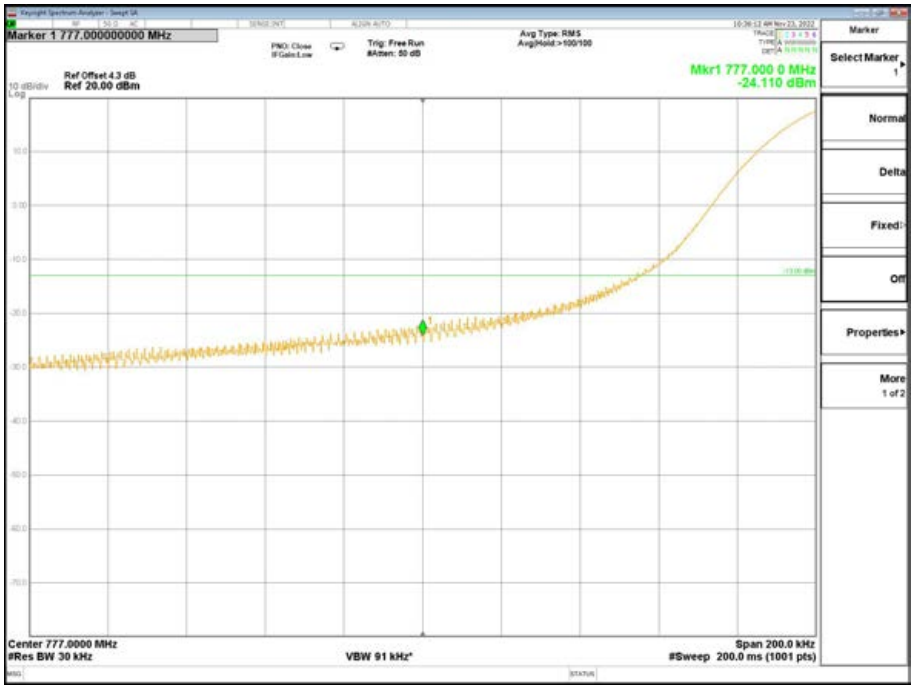

Keysight Spectrum Analyzer - Swept SA
Marker 1 774.964000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold:>100/100
02:26:50 PM Dec 09, 2022
Mkr1 774.964 MHz
-56.874 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 763.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 775.000 MHz
Sweep 128.0 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

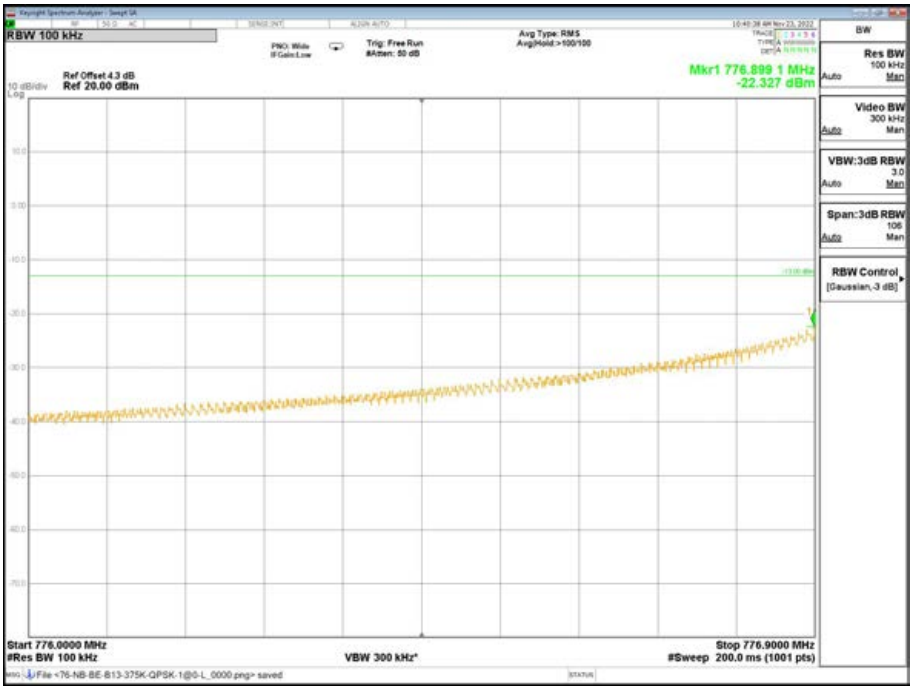

Keysight Spectrum Analyzer - Swept SA
Marker 1 796.393000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 29/100
02:50:12 PM Dec 09, 2022
Mkr1 796.393 MHz
-63.103 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

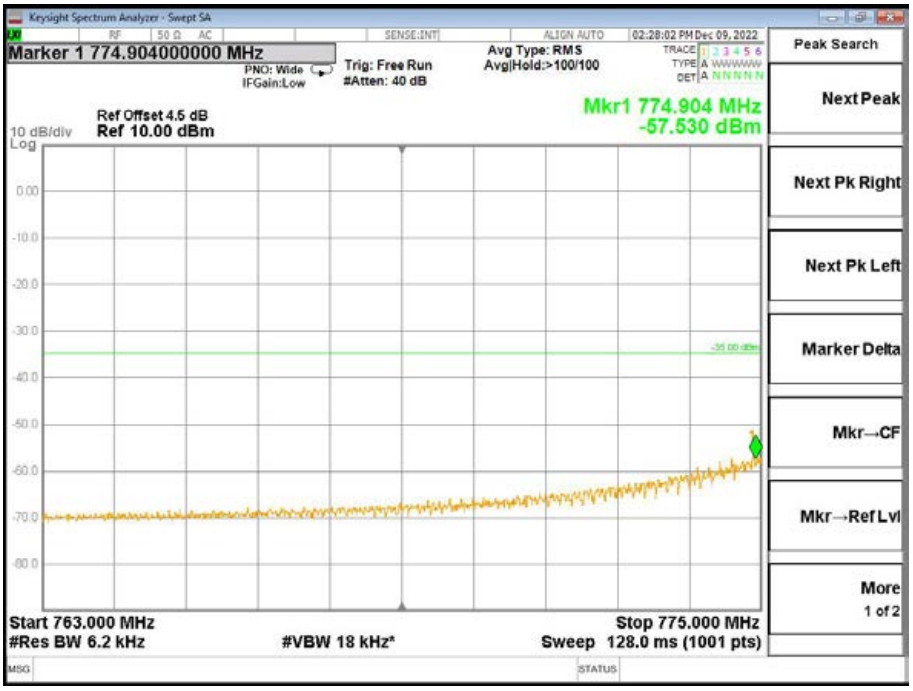


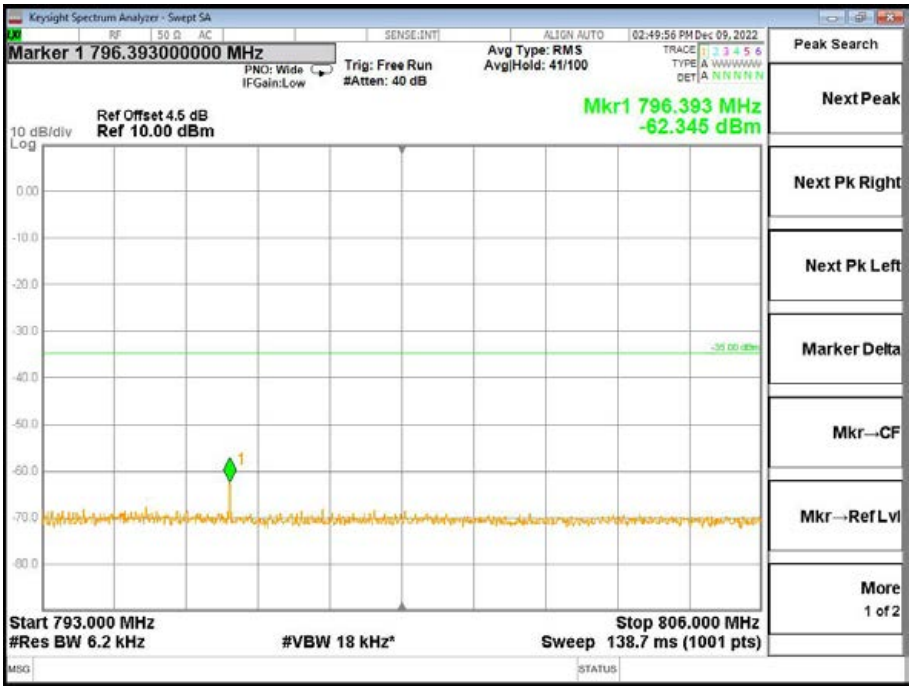
For the 1559-1610MHz test band，the worst case: -48.137dBm+Antenna Gain(4dBi)=-44.137dBm

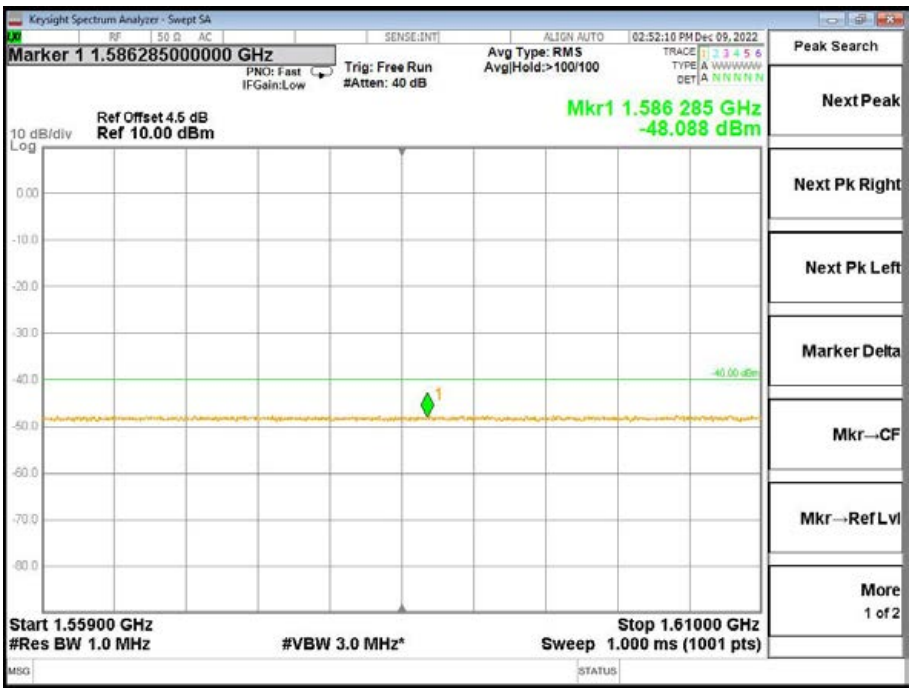
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0




RBW 100 kHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Log
Trig: Free Run
#Atten: 50 dB
Avg Type: RMS
Avg|Hold:>100/100
Mkr1 776.899 1 MHz
-22.327 dBm
BW
Res BW
100 kHz
Auto Man
Video BW
300 kHz
Auto Man
VBW:3dB RBW
3.0
Auto Man
Span:3dB RBW
106
Auto Man
RBW Control
[Gaussian,-3 dB]
Start 776.0000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 776.9000 MHz
#Sweep 200.0 ms (1001 pts)

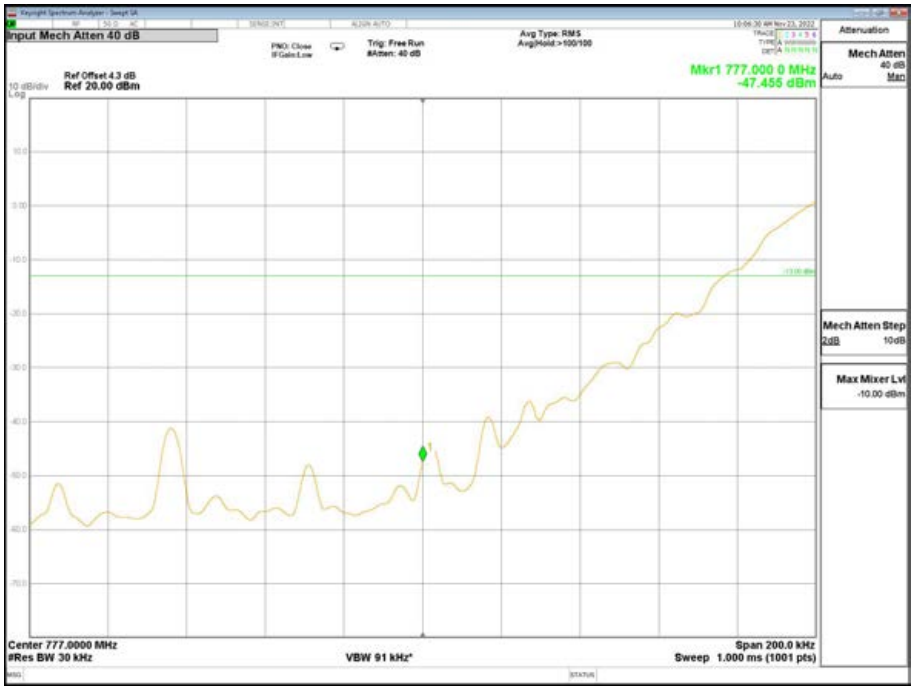

Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
02:28:02 PM Dec 09, 2022
Marker 1 774.904000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE A WWWWW
DET A N N N N N
Mkr1 774.904 MHz
-57.530 dBm
Ref Offset 4.5 dB
10 dB/div Ref 10.00 dBm
Log
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Start 763.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 775.000 MHz
Sweep 128.0 ms (1001 pts)
MSG
STATUS

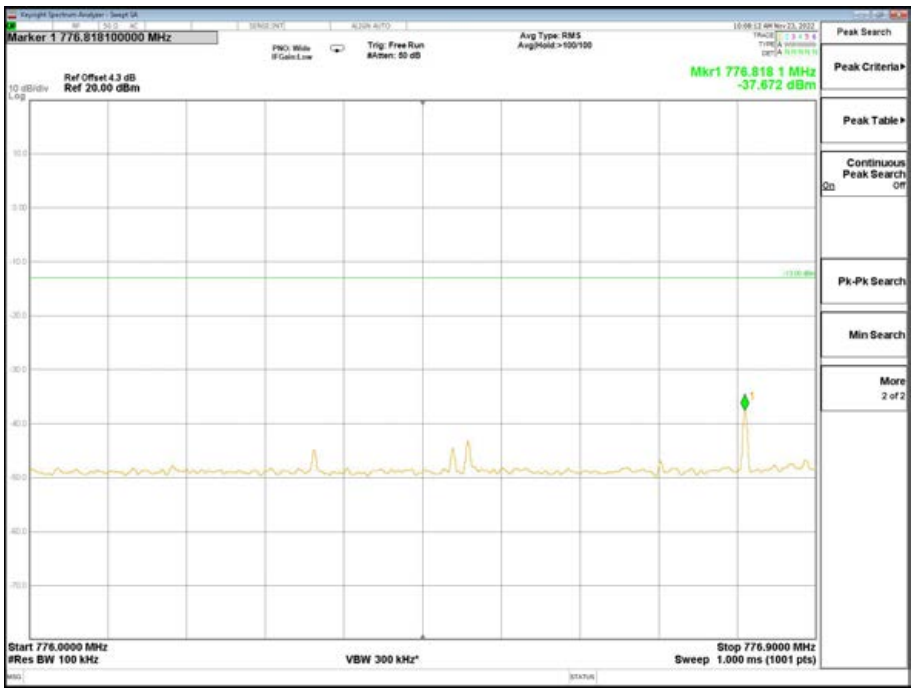


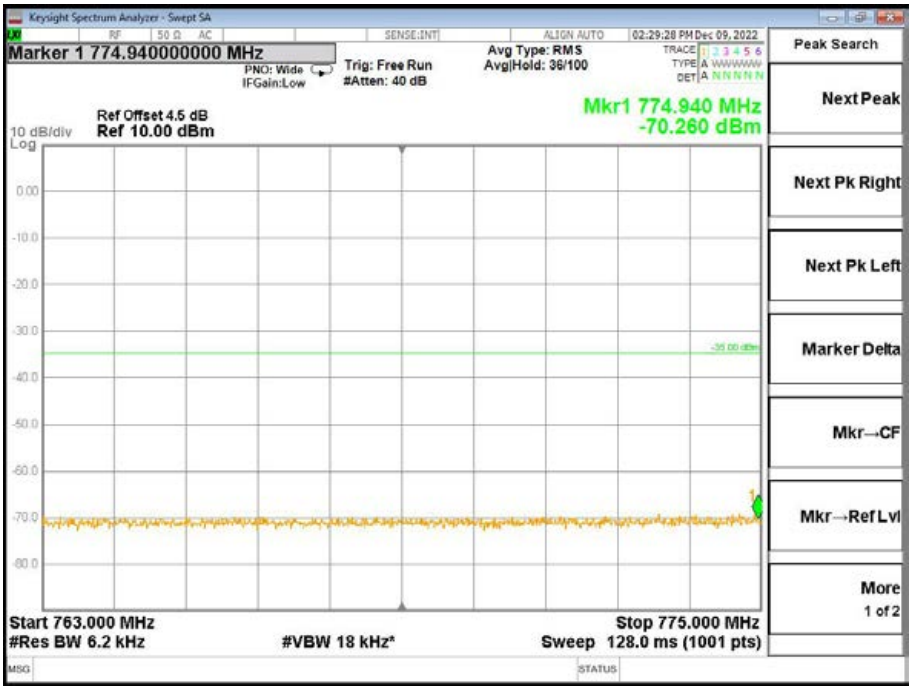


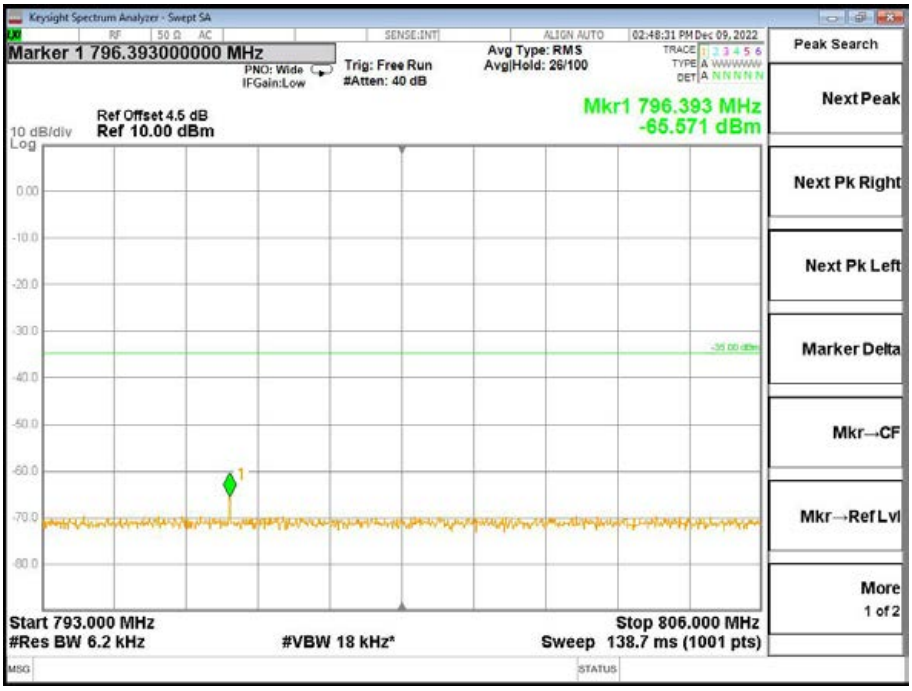
For the 1559-1610MHz test band，the worst case: -48.088dBm+Antenna Gain(4dBi)=-44.088dBm

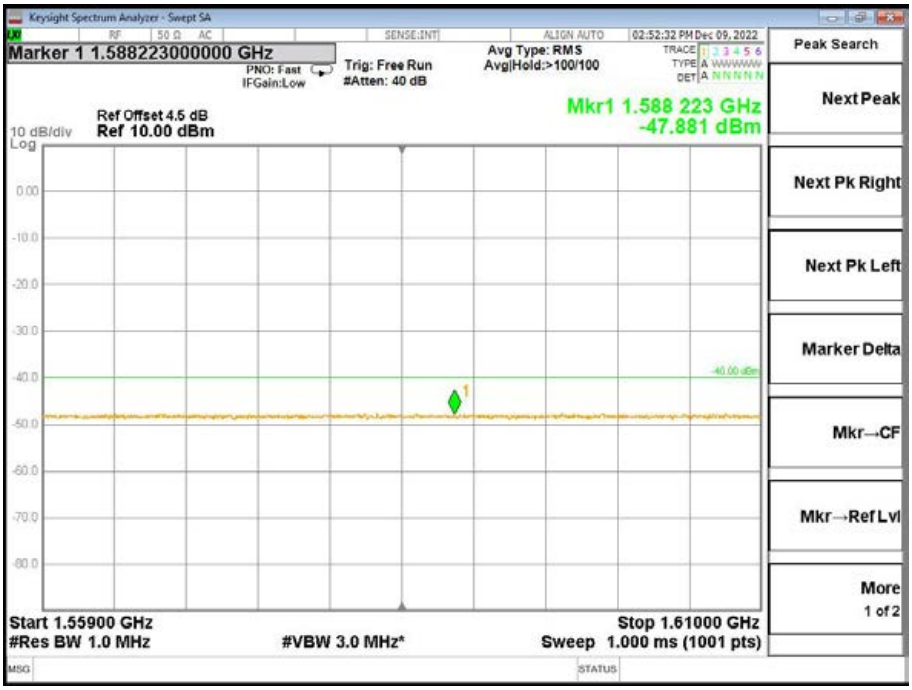
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0


Input Mech Atten 40 dB
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 4.3 dB
10 dB/div
Ref 20.00 dBm
Mkr1 777.000 0 MHz
-47.455 dBm
Attenuation
Mech Atten
40 dB
Auto
Man
Mech Atten Step
2dB
10dB
Max Mixer Lvl
-10.00 dBm
Center 777.0000 MHz
#Res BW 30 kHz
VBW 91 kHz*
Span 200.0 kHz
Sweep 1.000 ms (1001 pts)


Marker 1 776.818100000 MHz
Trig: Free Run
#Atten: 50 dB
Avg Type: RMS
Avg|Hold:>100/100
Ref Offset 4.3 dB
10 dB/div
Ref 20.00 dBm
Mkr1 776.818 1 MHz
-37.672 dBm
Peak Search
Peak Criteria
Peak Table
Continuous Peak Search
On
Off
Pk-Pk Search
Min Search
More
2 of 2
Start 776.0000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 776.9000 MHz
Sweep 1.000 ms (1001 pts)

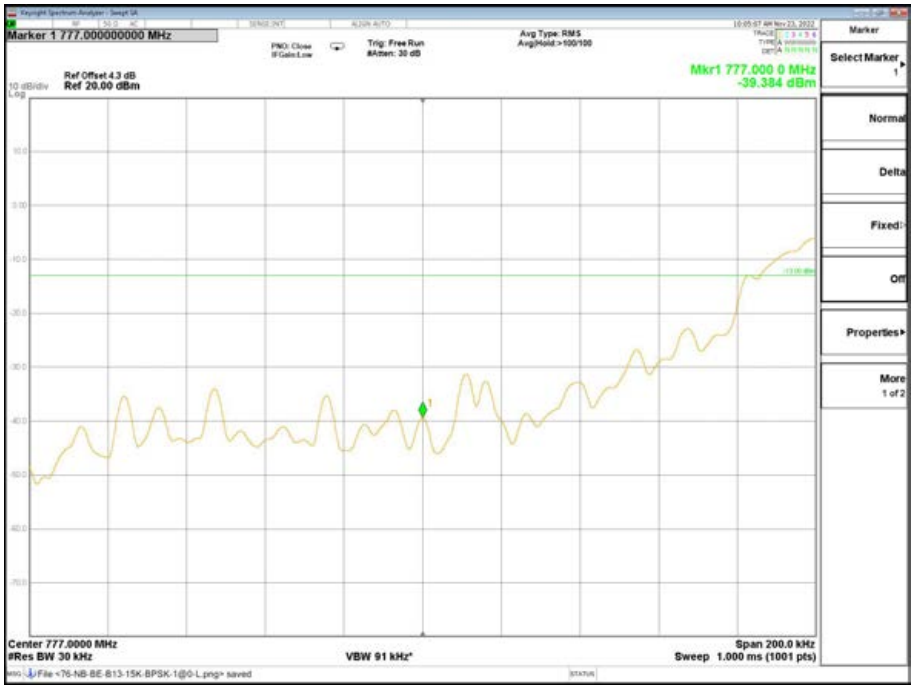

Keysight Spectrum Analyzer - Swept SA
Marker 1 774.940000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 36/100
02:29:28 PM Dec 09, 2022
Mkr1 774.940 MHz
-70.260 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 763.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 775.000 MHz
Sweep 128.0 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

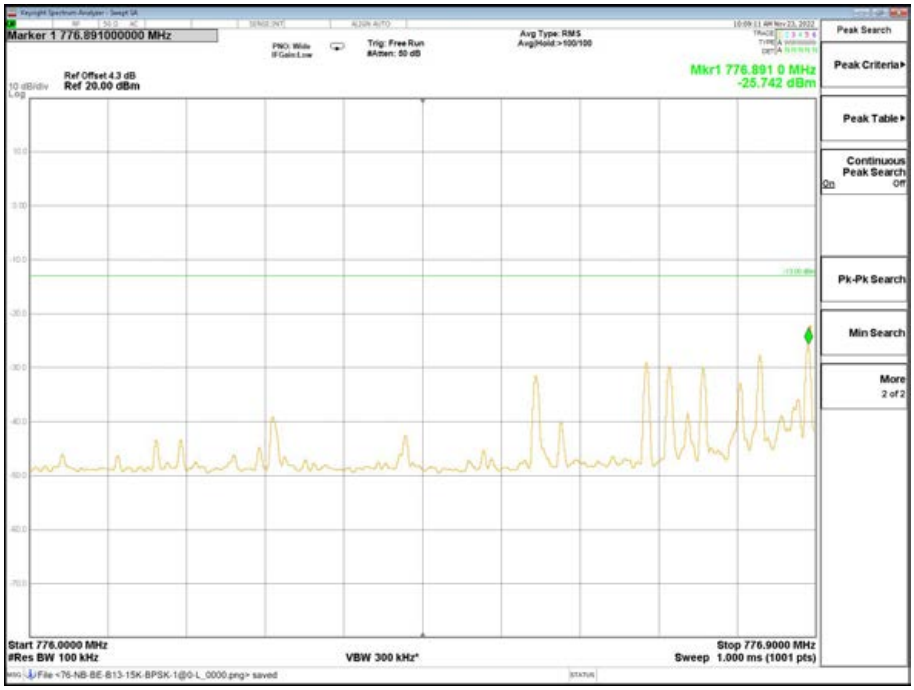

Keysight Spectrum Analyzer - Swept SA
Marker 1 796.393000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 26/100
02:48:31 PM Dec 09, 2022
Mkr1 796.393 MHz
-65.571 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

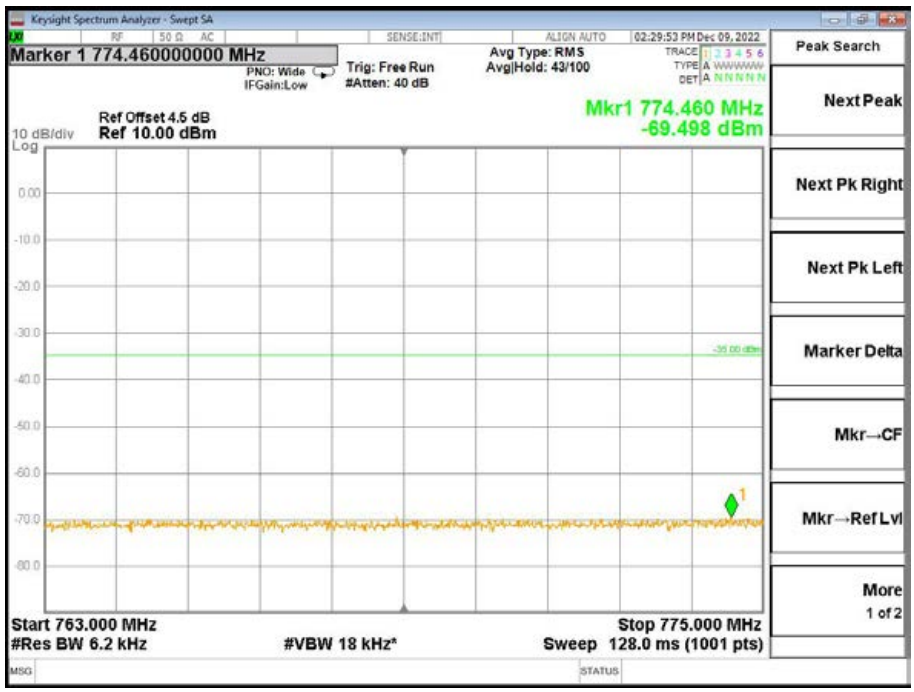


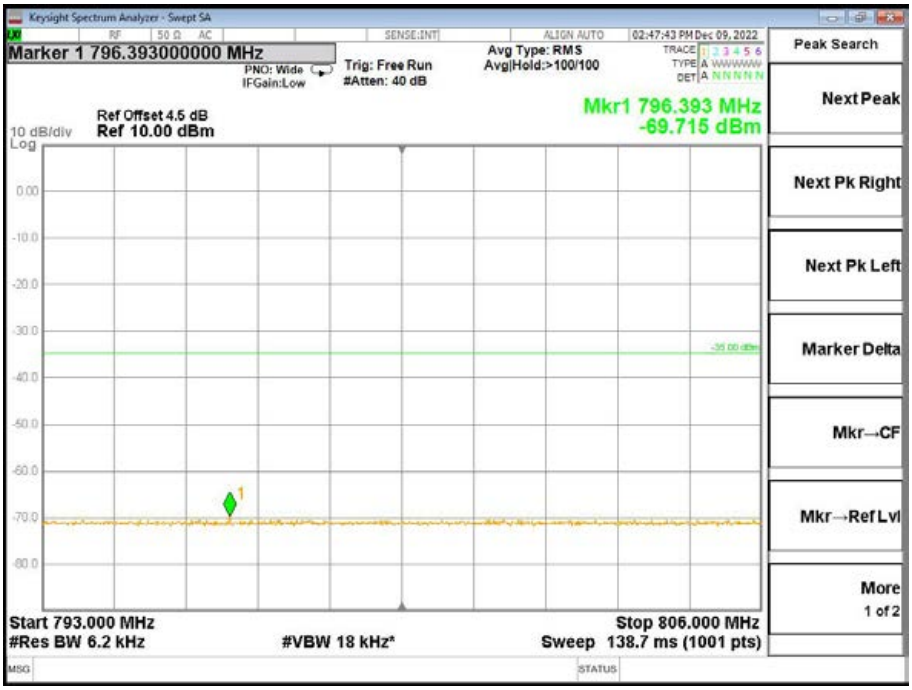
For the 1559-1610MHz test band，the worst case: -47.881dBm+Antenna Gain(4dBi)=-43.881dBm

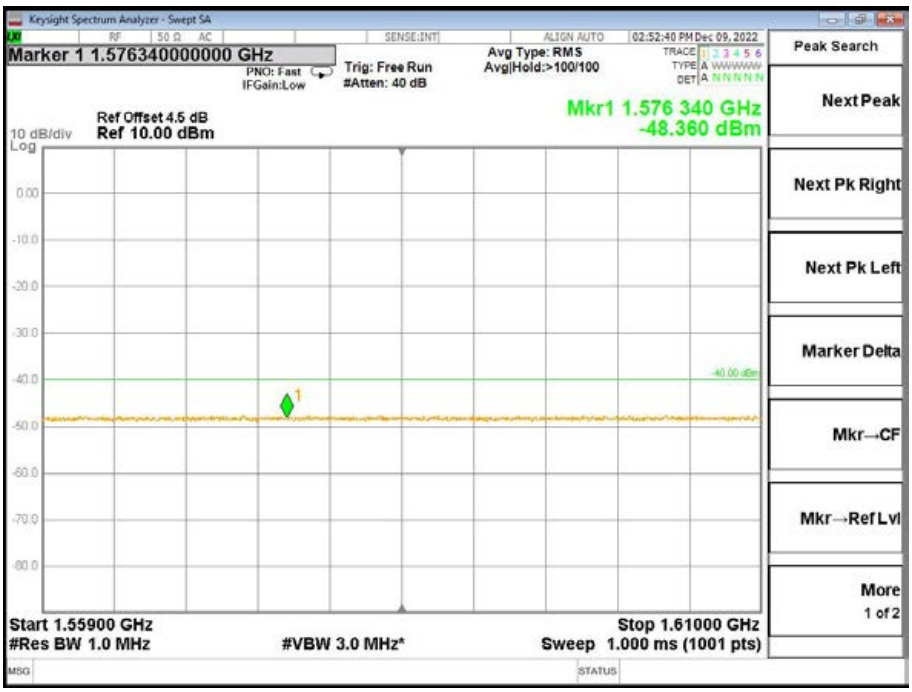
Low Channel, Subcarrier (15kHz), QPSK, 1@0




Marker 1 776.891000000 MHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Log
Mkr1 776.891 0 MHz
-25.742 dBm
Peak Search
Peak Criteria
Peak Table
Continuous Peak Search
Pk-Pk Search
Min Search
More 2 of 2
Start 776.0000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 776.9000 MHz
Sweep 1.000 ms (1001 pts)

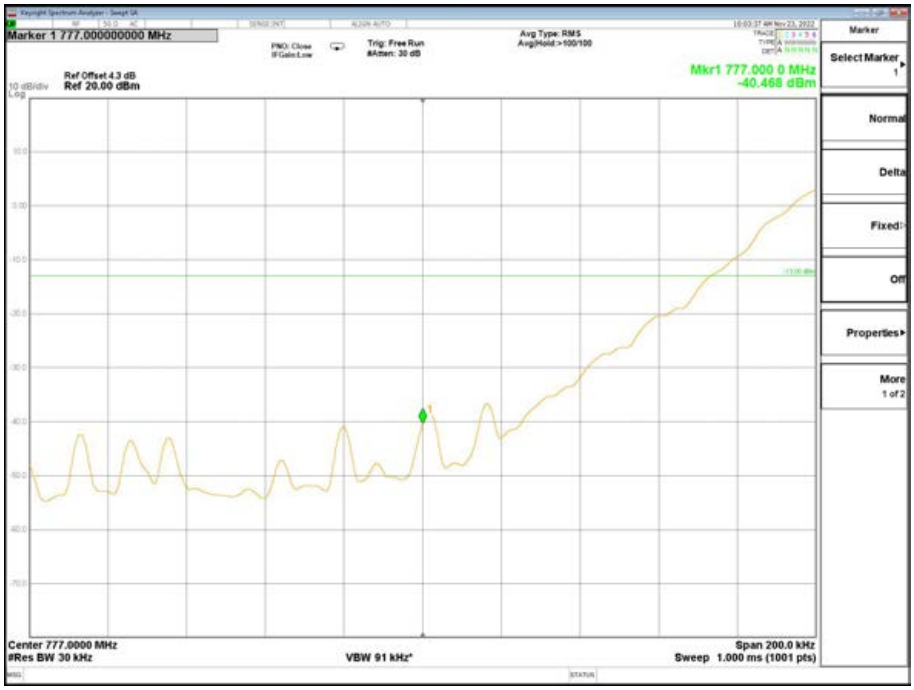

Keysight Spectrum Analyzer - Swept SA
Marker 1 774.460000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 43/100
02:29:53 PM Dec 09, 2022
Ref Offset 4.5 dB
10 dB/div Ref 10.00 dBm
Log
Mkr1 774.460 MHz
-69.498 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More 1 of 2
Start 763.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 775.000 MHz
Sweep 128.0 ms (1001 pts)
MSG
STATUS

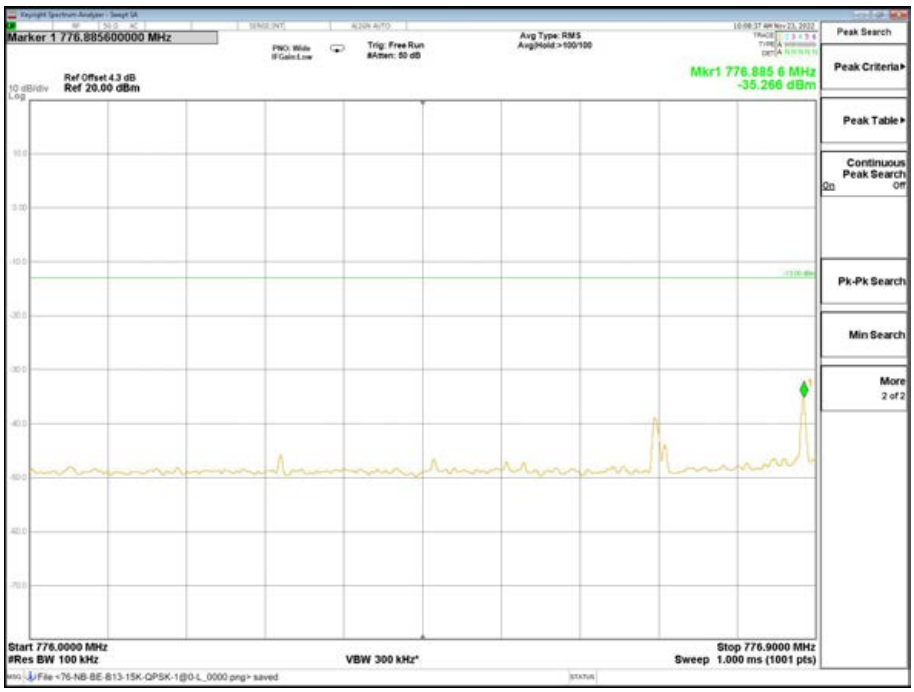


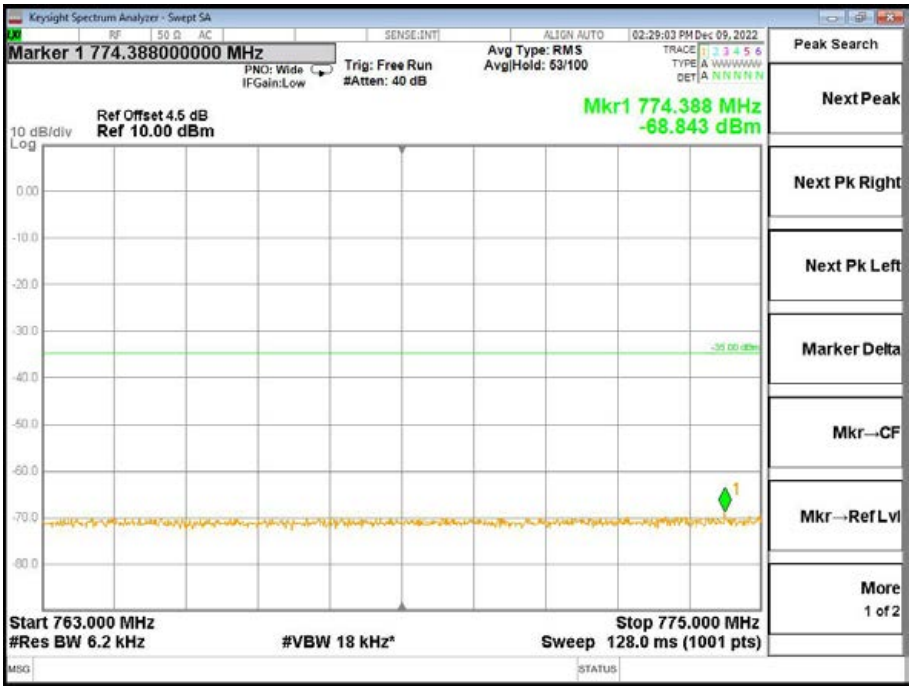


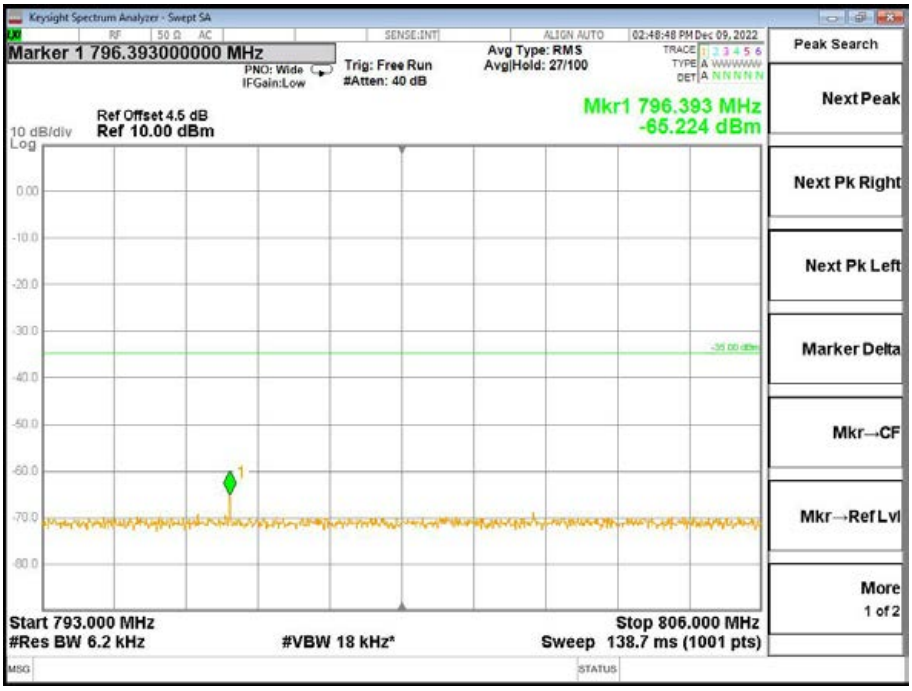
For the 1559-1610MHz test band，the worst case: -48.360dBm+Antenna Gain(4dBi)=-44.360dBm

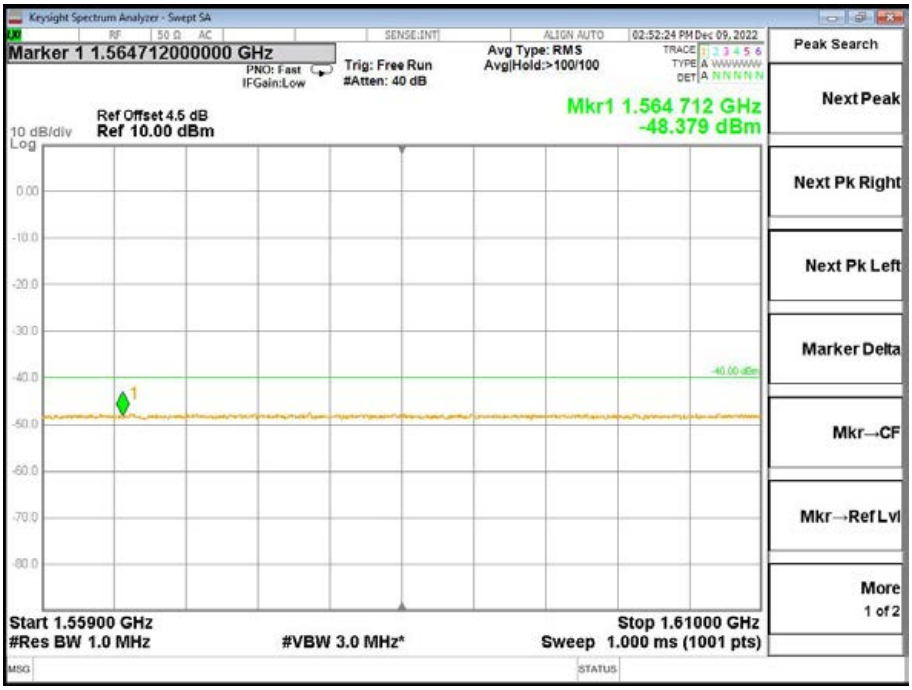
Low Channel, Subcarrier (15kHz), QPSK, 12@0


Marker 1 777.000000000 MHz
Avg Type: RMS
Trig: Free Run
#Atten: 30 dB
Mkr1 777.000 0 MHz
-40.468 dBm
Ref Offset 4.3 dB
10 dB/div
Ref 20.00 dBm
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
Center 777.0000 MHz
#Res BW 30 kHz
VBW 91 kHz*
Span 200.0 kHz
Sweep 1.000 ms (1001 pts)


Marker 1 776.885600000 MHz
Avg Type: RMS
Trig: Free Run
#Atten: 50 dB
Mkr1 776.885 6 MHz
-35.266 dBm
Ref Offset 4.3 dB
10 dB/div
Ref 20.00 dBm
Peak Search
Peak Criteria
Peak Table
Continuous Peak Search
On
Off
Pk-Pk Search
Min Search
More
2 of 2
Start 776.0000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 776.9000 MHz
Sweep 1.000 ms (1001 pts)

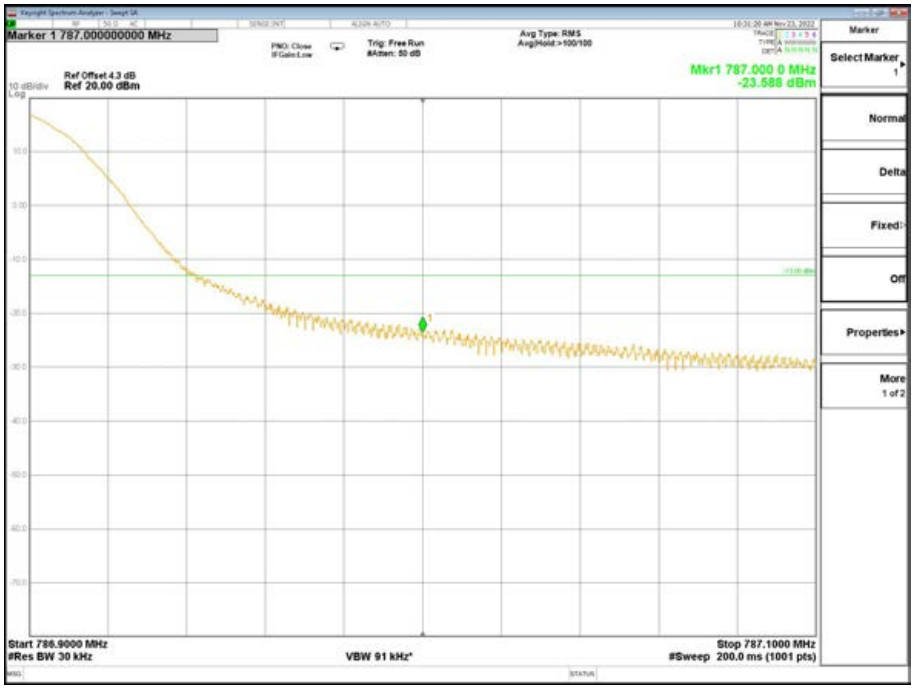

Keysight Spectrum Analyzer - Swept SA
Marker 1 774.388000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 53/100
02:29:03 PM Dec 09, 2022
Mkr1 774.388 MHz
-68.843 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 763.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 775.000 MHz
Sweep 128.0 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

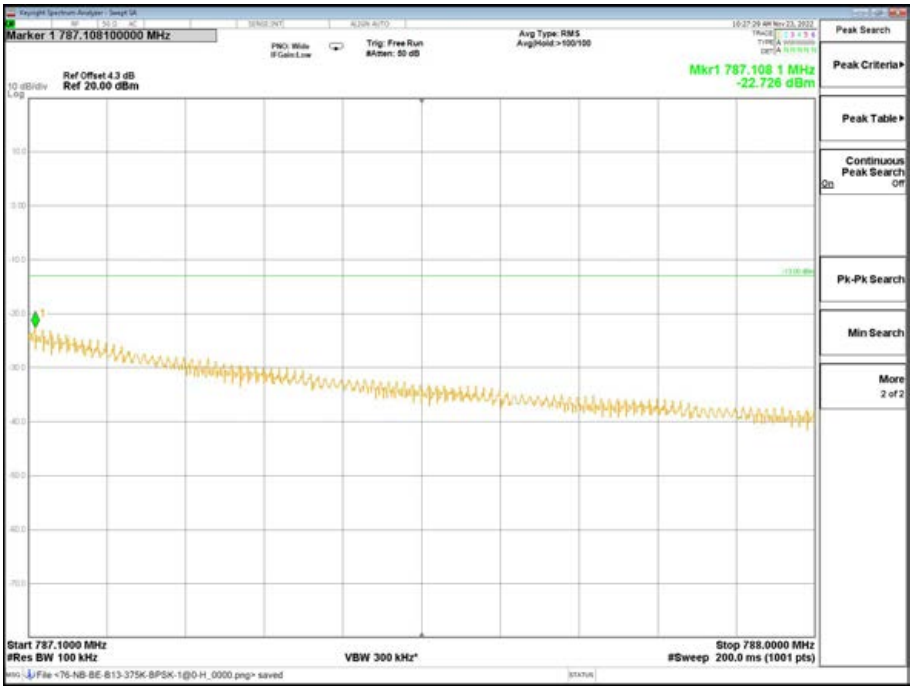

Keysight Spectrum Analyzer - Swept SA
Marker 1 796.393000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 27/100
02:48:48 PM Dec 09, 2022
Mkr1 796.393 MHz
-65.224 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

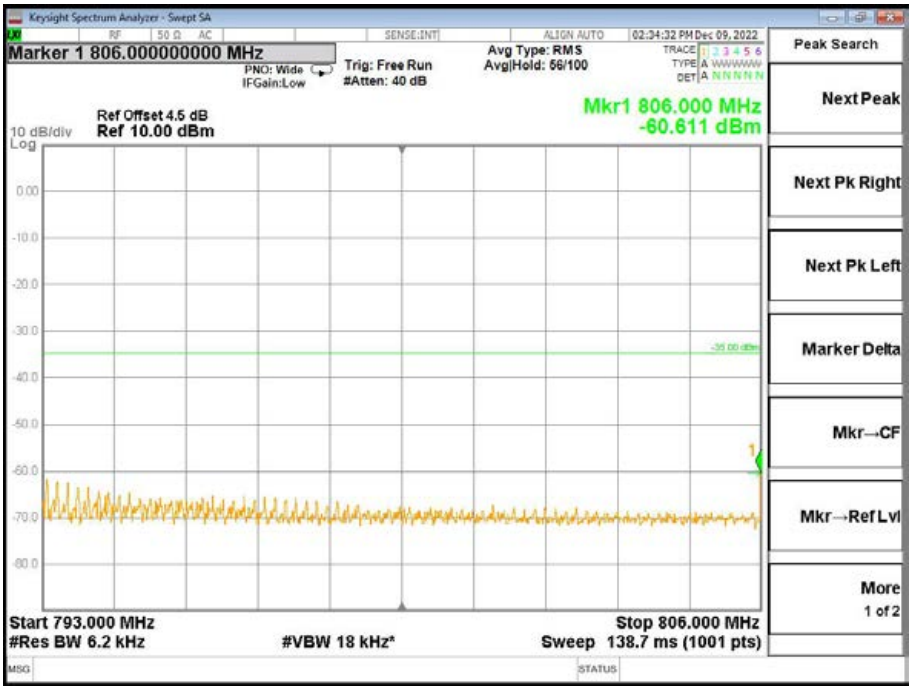


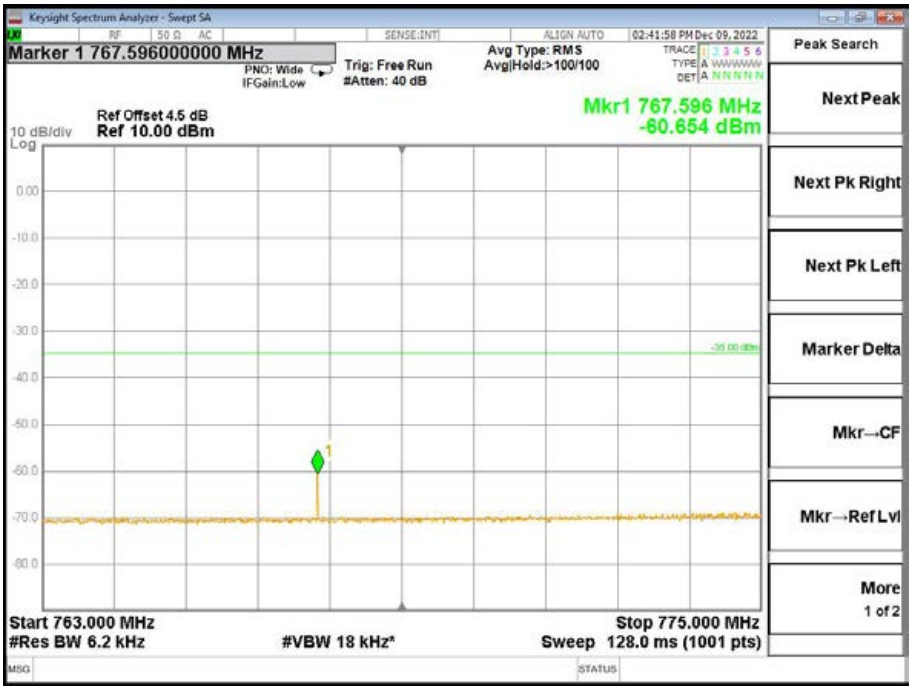
For the 1559-1610MHz test band，the worst case: -48.379dBm+Antenna Gain(4dBi)=-44.379dBm

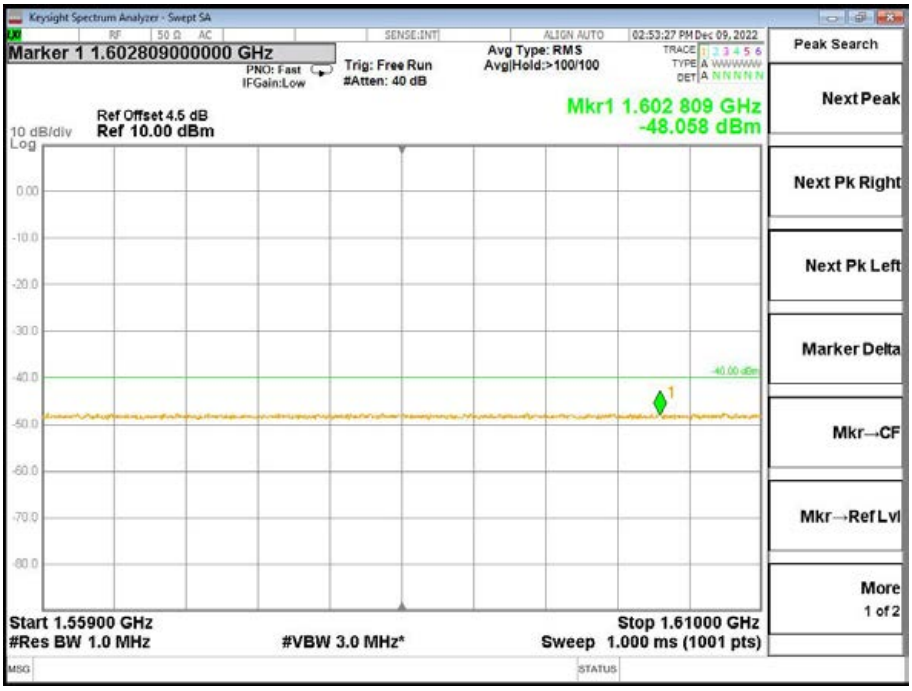
Low Channel, Subcarrier (15kHz), BPSK, 1@0




Marker 1 787.108100000 MHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Log
Mkr1 787.108 1 MHz
-22.726 dBm
Peak Search
Peak Criteria
Peak Table
Continuous Peak Search
Pk-Pk Search
Min Search
More 2 of 2
Start 787.1000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 788.0000 MHz
#Sweep 200.0 ms (1001 pts)

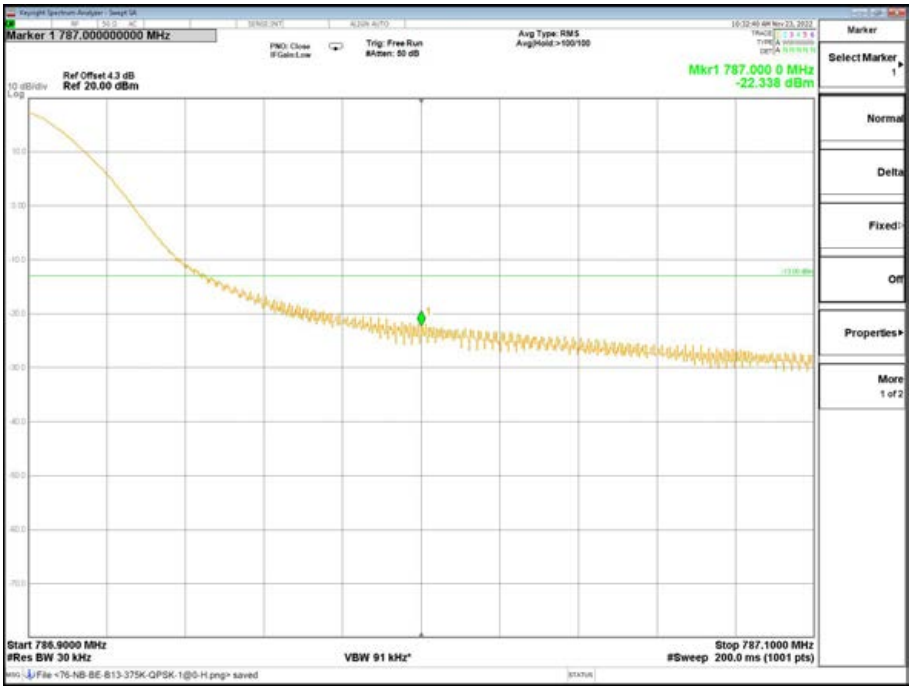

Keysight Spectrum Analyzer - Swept SA
Marker 1 806.000000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 56/100
02:34:32 PM Dec 09, 2022
Ref Offset 4.5 dB
10 dB/div Ref 10.00 dBm
Log
Mkr1 806.000 MHz
-60.611 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More 1 of 2
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)

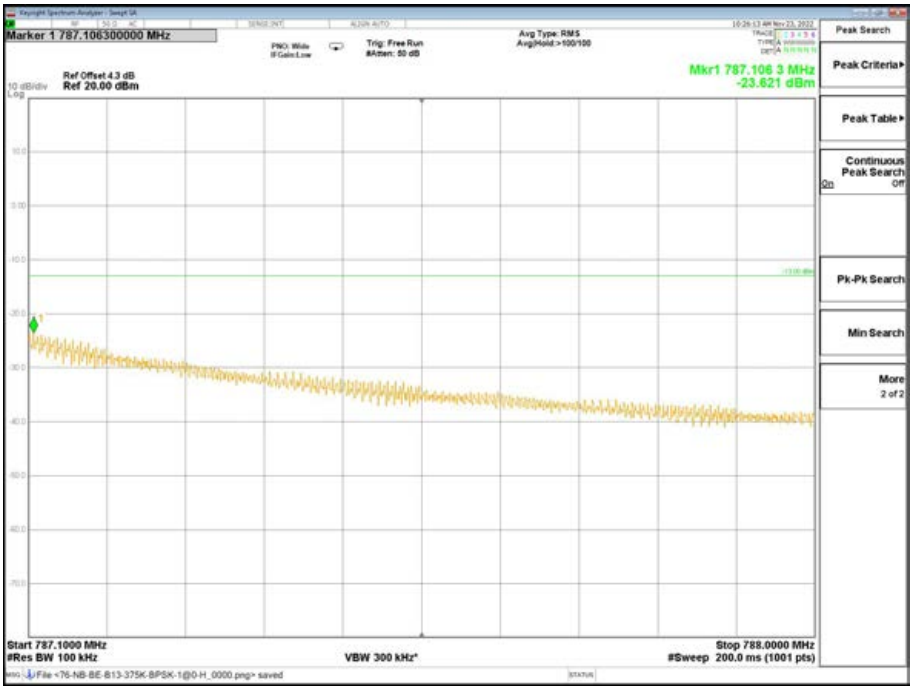


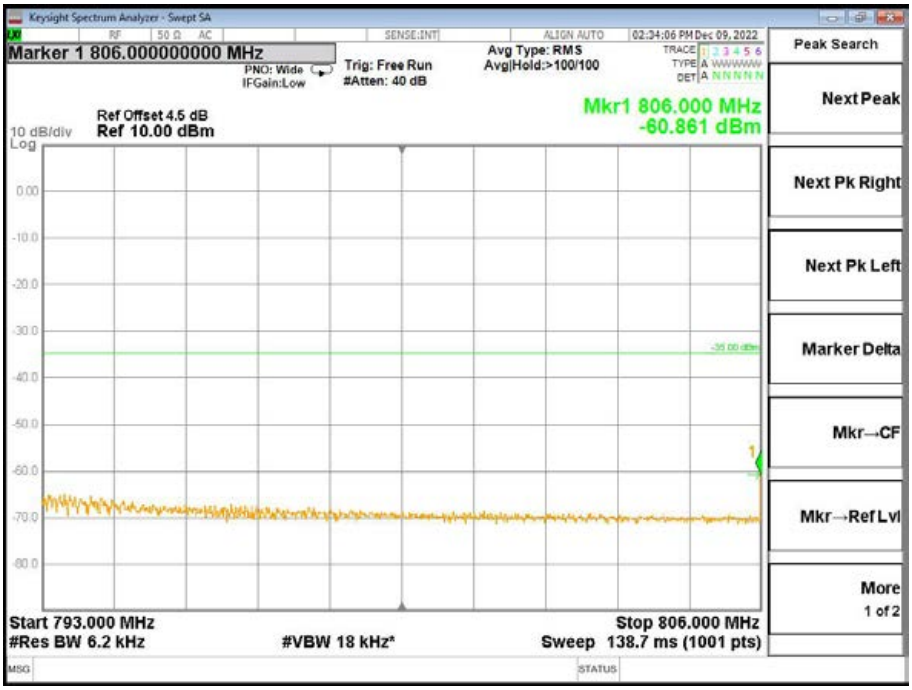


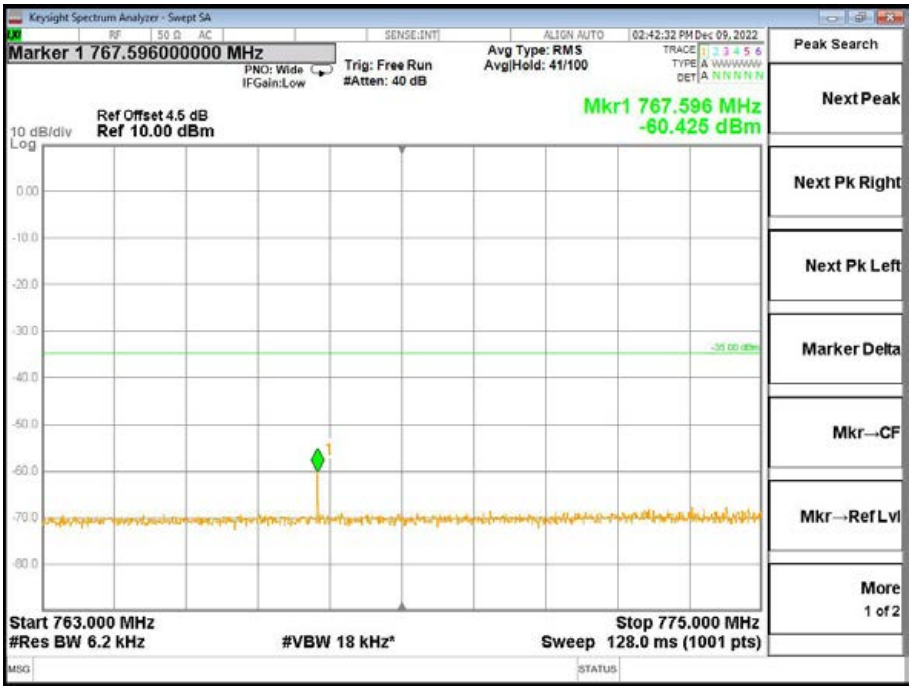
For the 1559-1610MHz test band，the worst case: -48.058dBm+Antenna Gain(4dBi)=-44.058dBm

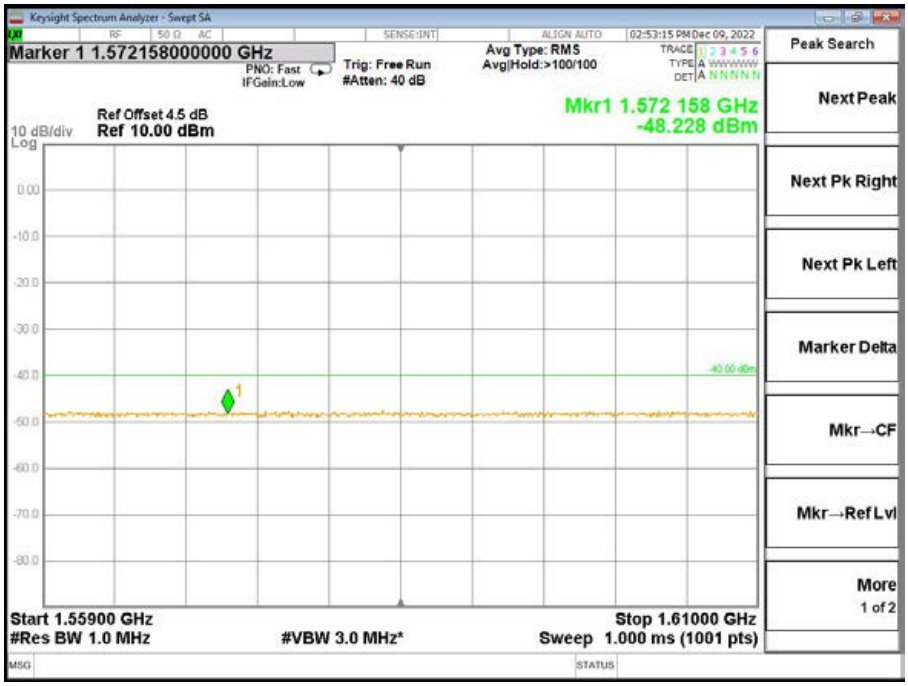
High Channel, Subcarrier (3.75kHz), QPSK, 1@47


Marker 1 787.000000000 MHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Avg Type: RMS
Trig: Free Run
#Atten: 50 dB
Mkr1 787.000 0 MHz
-22.338 dBm
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
Start 786.9000 MHz
#Res BW 30 kHz
VBW 91 kHz*
Stop 787.1000 MHz
#Sweep 200.0 ms (1001 pts)


Marker 1 787.106300000 MHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Avg Type: RMS
Trig: Free Run
#Atten: 50 dB
Mkr1 787.106 3 MHz
-23.621 dBm
Peak Search
Peak Criteria
Peak Table
Continuous Peak Search
On
Off
Pk-Pk Search
Min Search
More
2 of 2
Start 787.1000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 788.0000 MHz
#Sweep 200.0 ms (1001 pts)

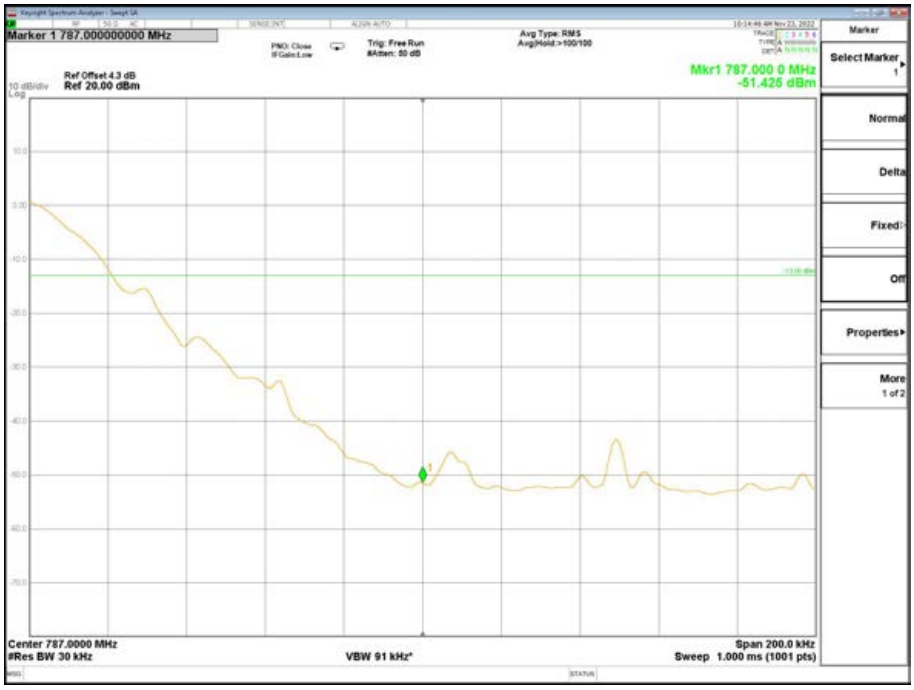

Keysight Spectrum Analyzer - Swept SA
Marker 1 806.000000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold:>100/100
02:34:06 PM Dec 09, 2022
Mkr1 806.000 MHz
-60.861 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

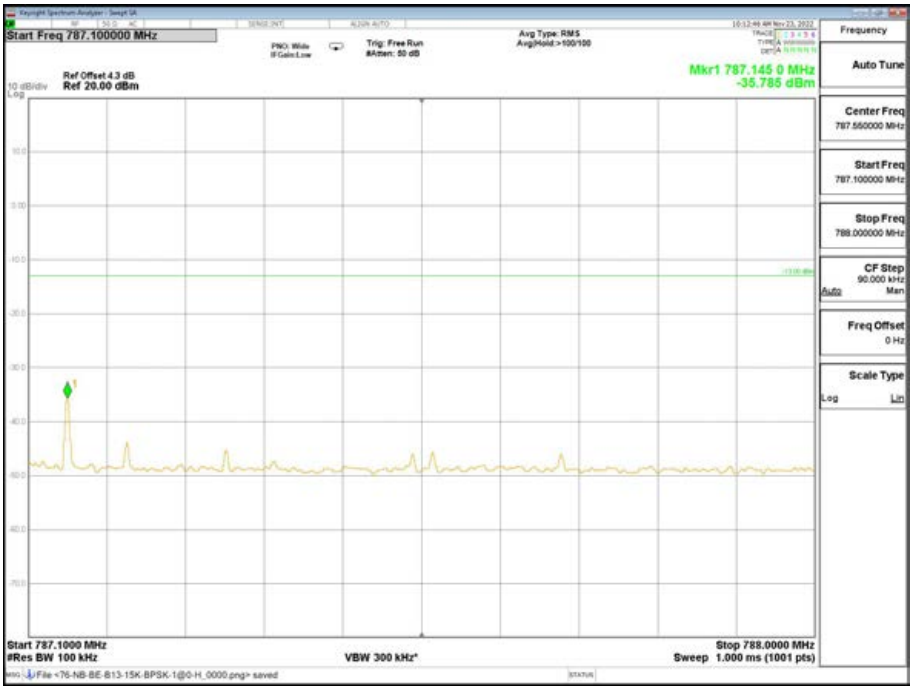

Keysight Spectrum Analyzer - Swept SA
Marker 1 767.596000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 41/100
02:42:32 PM Dec 09, 2022
Mkr1 767.596 MHz
-60.425 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 763.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 775.000 MHz
Sweep 128.0 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

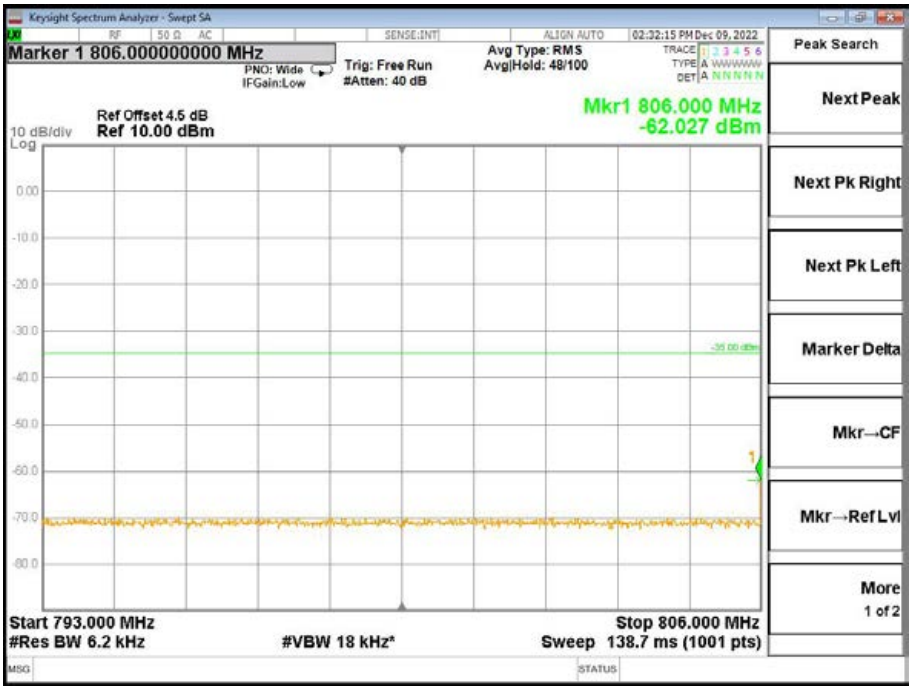


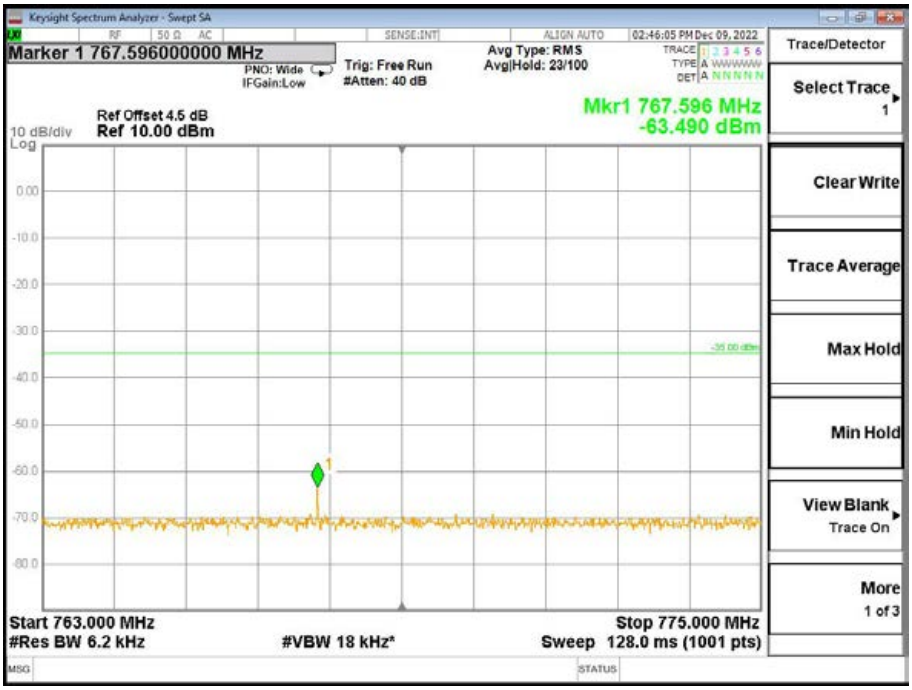
For the 1559-1610MHz test band，the worst case: -48.228dBm+Antenna Gain(4dBi)=-44.228dBm

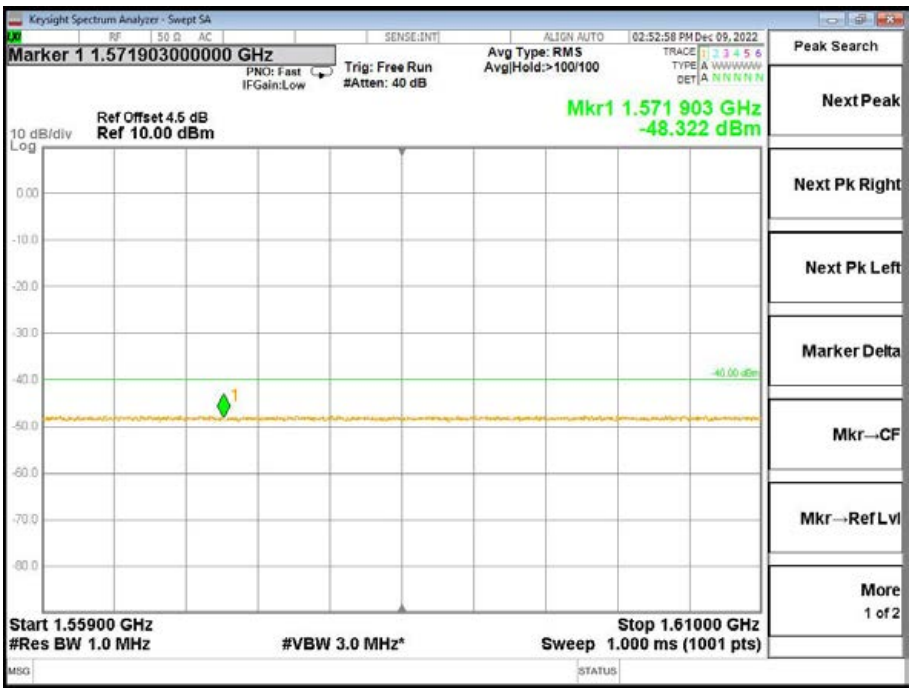
High Channel, Subcarrier (3.75kHz), BPSK, 1@47




Start Freq 787.100000 MHz
Avg Type: RMS
Trig: Free Run
#Atten: 50 dB
Mkr1 787.145 0 MHz
-35.785 dBm
Ref Offset 4.3 dB
10 dB/div
Ref 20.00 dBm
Log
Frequency
Auto Tune
Center Freq
787.550000 MHz
Start Freq
787.100000 MHz
Stop Freq
788.000000 MHz
CF Step
90.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
Start 787.1000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 788.0000 MHz
Sweep 1.000 ms (1001 pts)

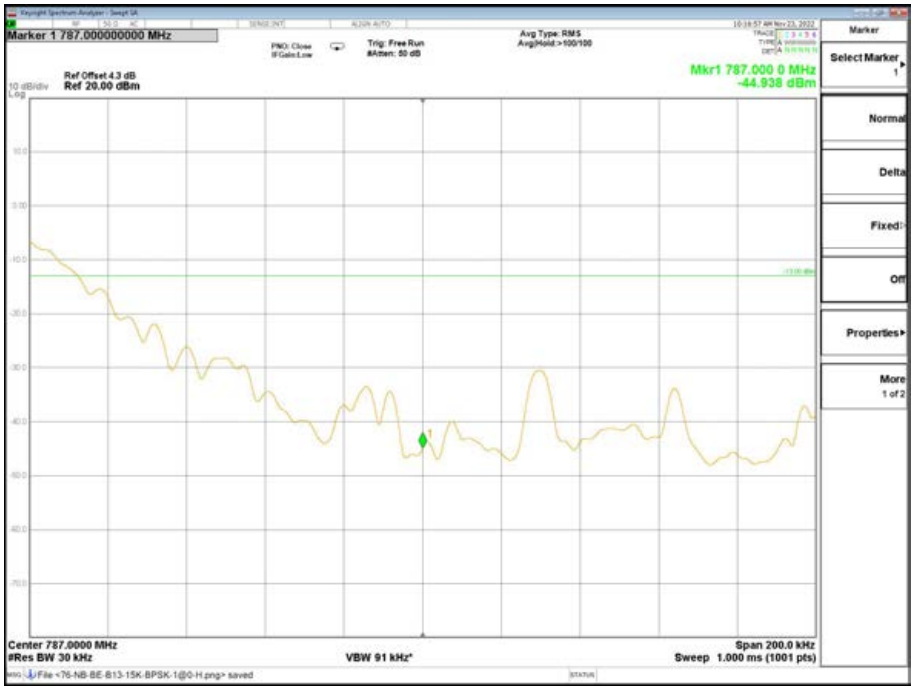

Keysight Spectrum Analyzer - Swept SA
RF
50 Ω
AC
SENSE:INT
ALIGN AUTO
02:32:15 PM Dec 09, 2022
Marker 1 806.000000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 48/100
TRACE 1 2 3 4 5 6
TYPE A WWWWW
DET A N N N N N
Mkr1 806.000 MHz
-62.027 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)
MSG
STATUS
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

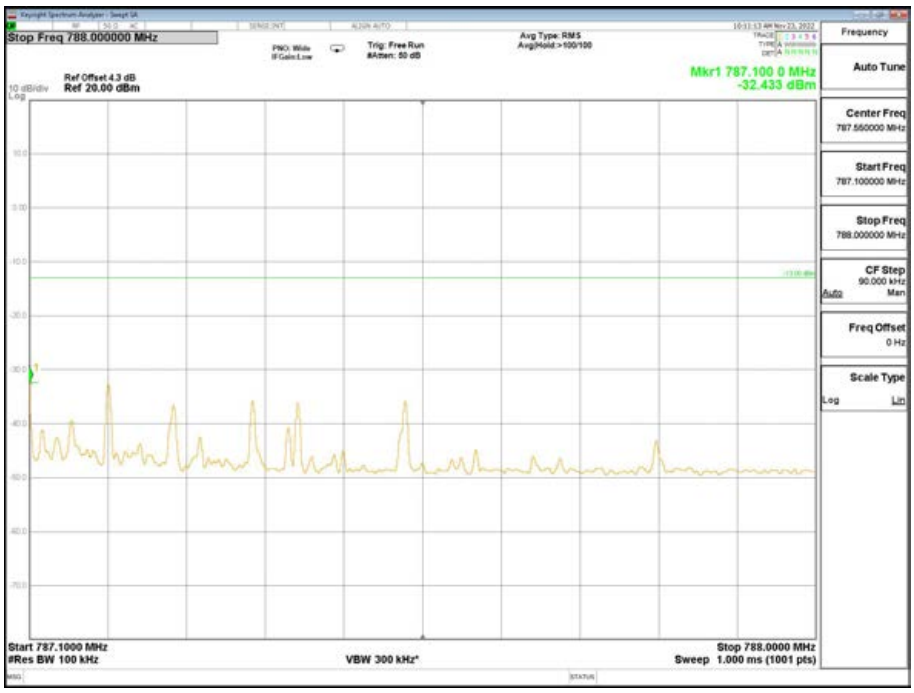


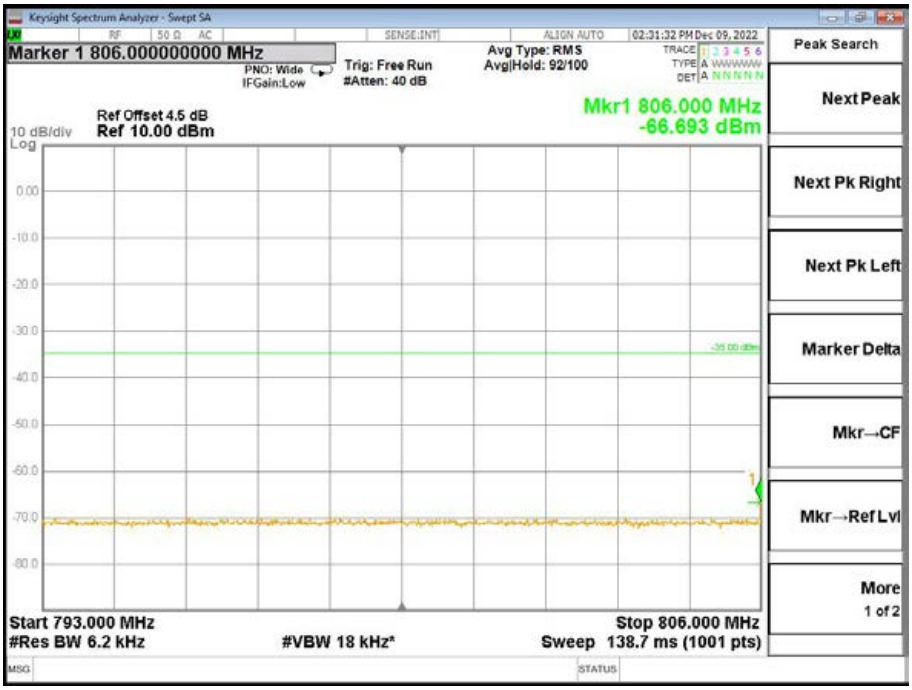


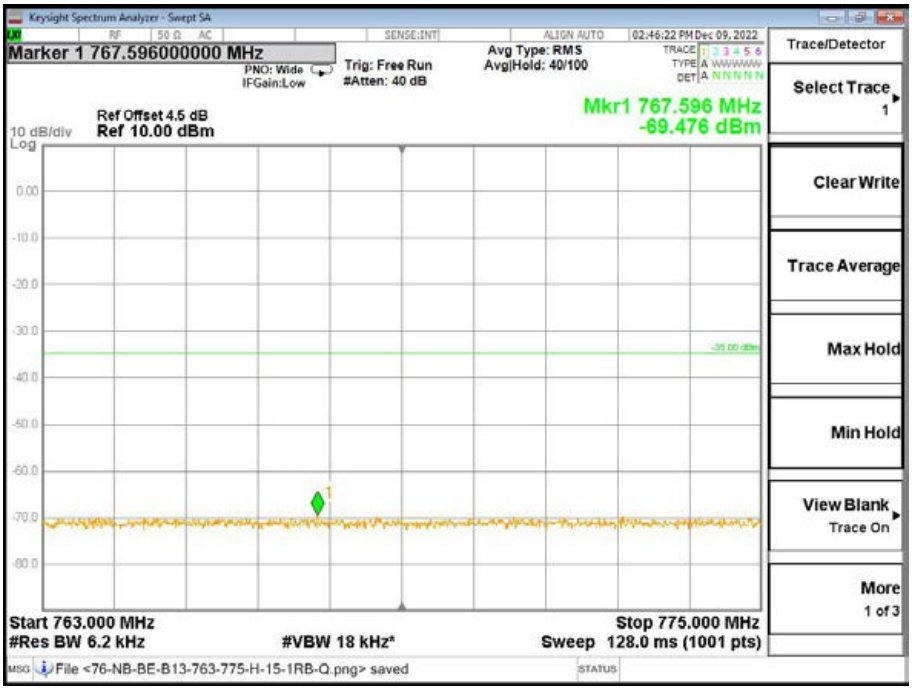
For the 1559-1610MHz test band，the worst case: -48.322dBm+Antenna Gain(4dBi)=-44.322dBm

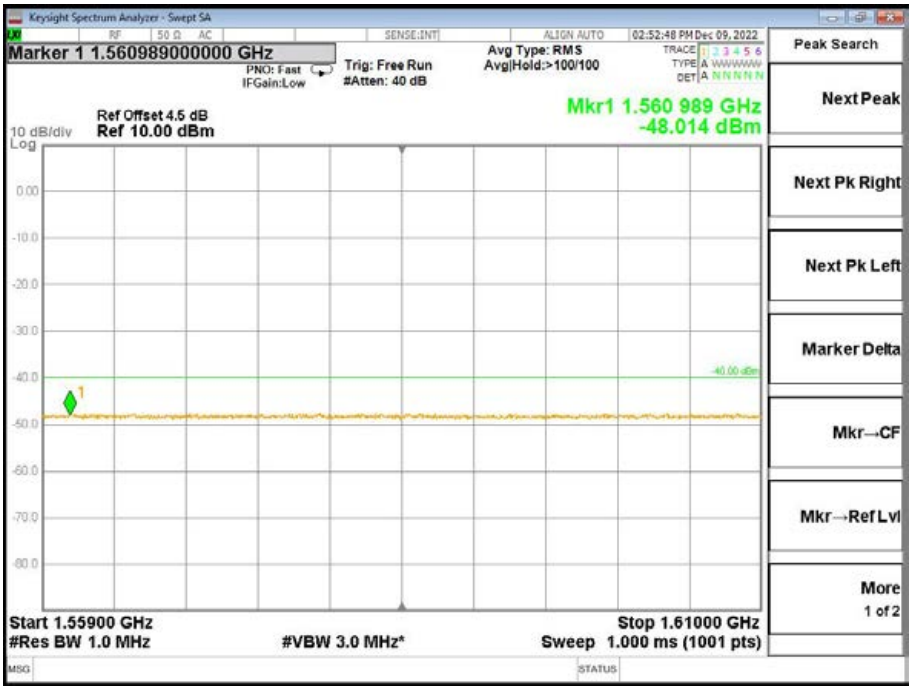
High Channel, Subcarrier (15kHz), QPSK, 1@11


Marker 1 787.000000000 MHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Avg Type: RMS
Avg|Hold:>100/100
Trig: Free Run
#Atten: 30 dB
Mkr1 787.000 0 MHz
-44.938 dBm
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2
Center 787.0000 MHz
#Res BW 30 kHz
VBW 91 kHz*
Span 200.0 kHz
Sweep 1.000 ms (1001 pts)


Stop Freq 788.000000 MHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Avg Type: RMS
Avg|Hold:>100/100
Trig: Free Run
#Atten: 30 dB
Mkr1 787.100 0 MHz
-32.433 dBm
Frequency
Auto Tune
Center Freq
787.550000 MHz
Start Freq
787.100000 MHz
Stop Freq
788.000000 MHz
CF Step
90.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
Start 787.1000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 788.0000 MHz
Sweep 1.000 ms (1001 pts)

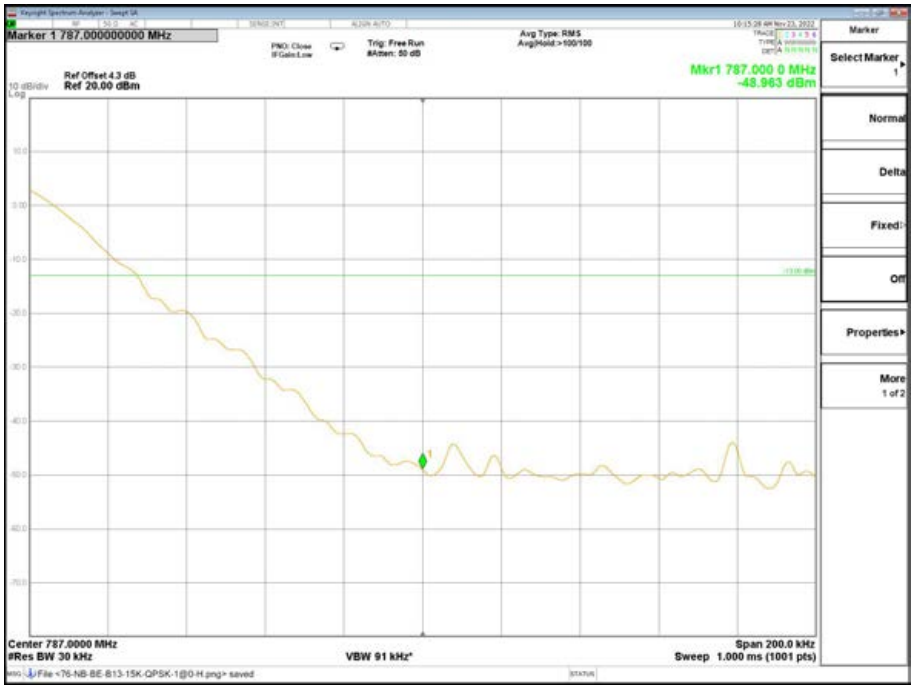

Keysight Spectrum Analyzer - Swept SA
Marker 1 806.000000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 92/100
02:31:32 PM Dec 09, 2022
Mkr1 806.000 MHz
-66.693 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

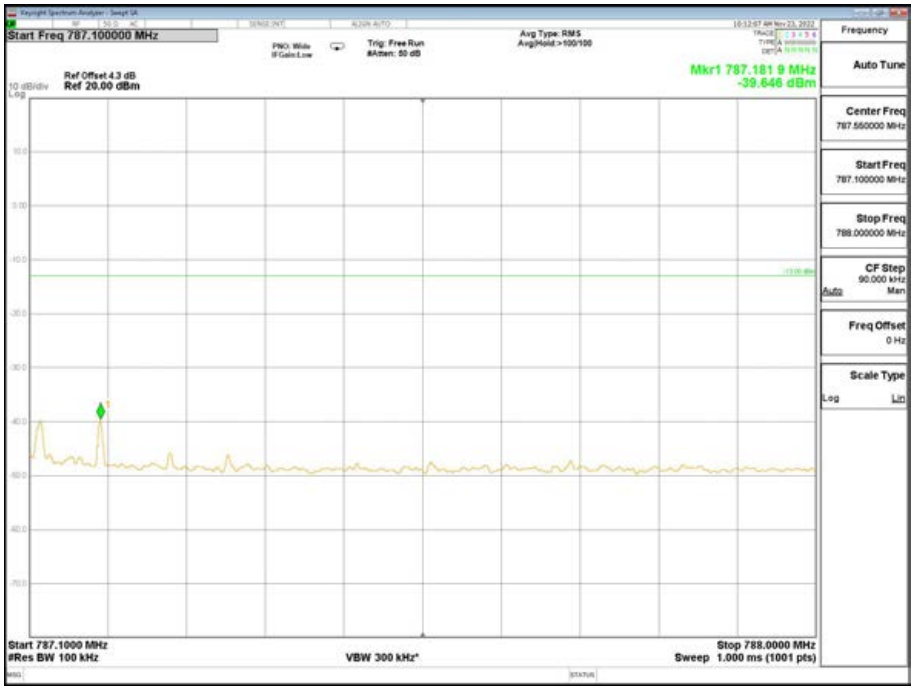

Keysight Spectrum Analyzer - Swept SA
Marker 1 767.596000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 40/100
02:46:22 PM Dec 09, 2022
Mkr1 767.596 MHz
-69.476 dBm
Ref Offset 4.5 dB
10 dB/div
Ref 10.00 dBm
Log
Start 763.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 775.000 MHz
Sweep 128.0 ms (1001 pts)
File <76-NB-BE-B13-763-775-H-15-1RB-Q.png> saved
Trace/Detector
Select Trace
1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank
Trace On
More
1 of 3

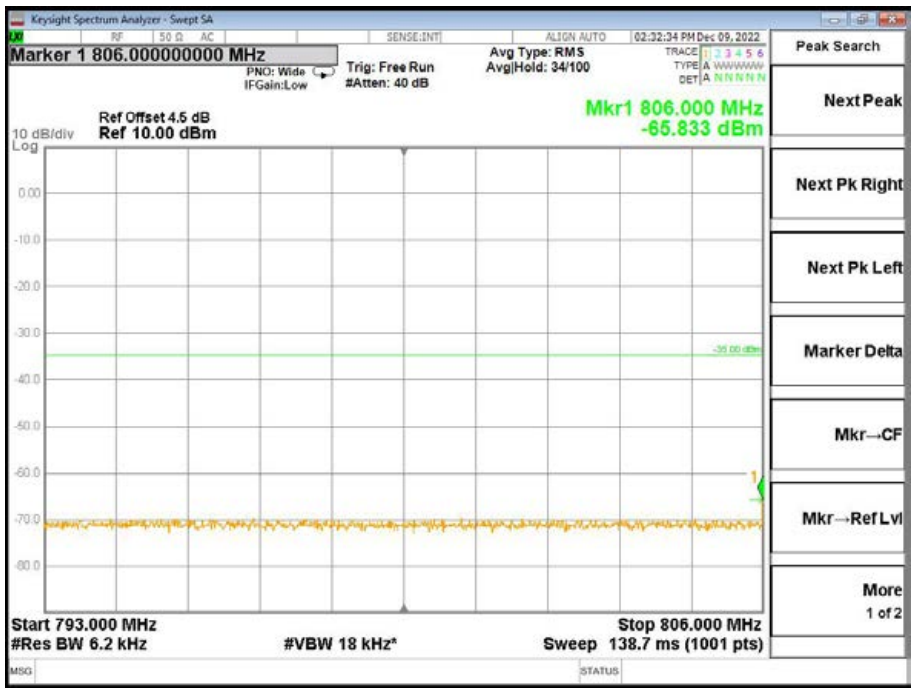


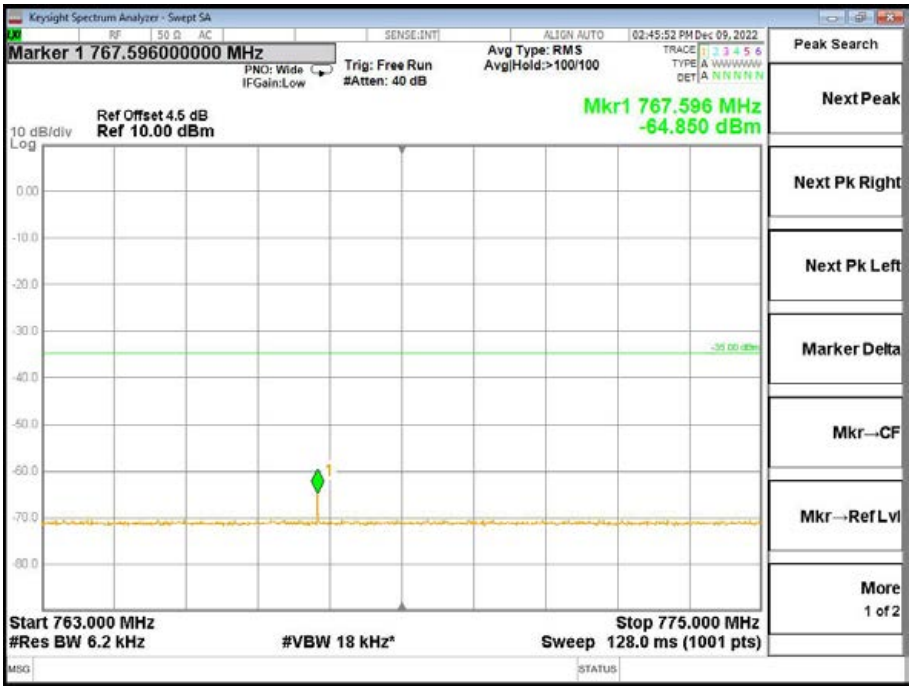
For the 1559-1610MHz test band，the worst case: -48.014dBm+Antenna Gain(4dBi)=-44.014dBm

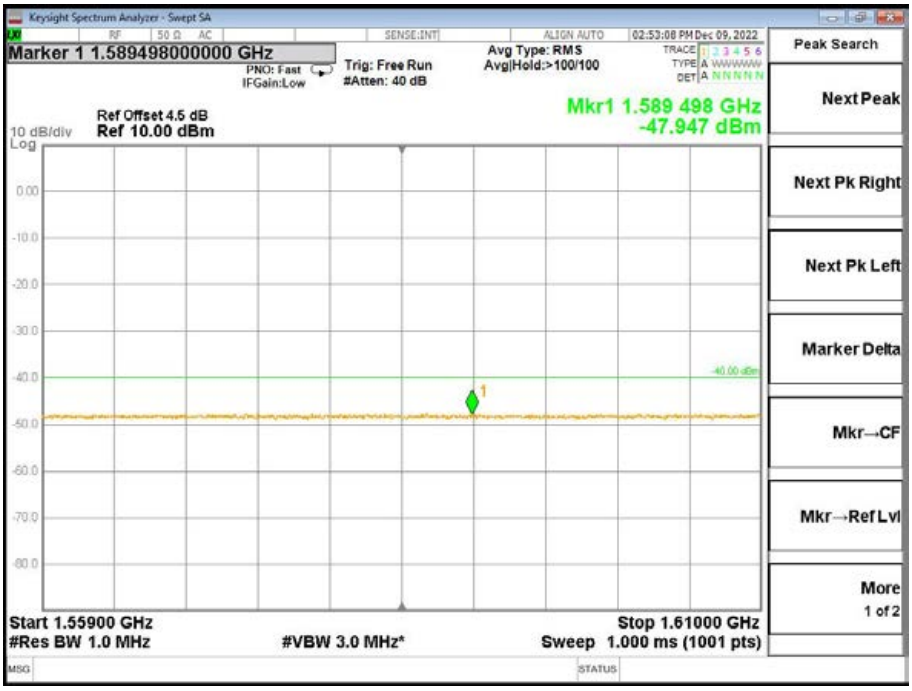
High Channel, Subcarrier (15kHz), QPSK, 12@0




Start Freq 787.100000 MHz
Ref Offset 4.3 dB
10 dB/div Ref 20.00 dBm
Log
Avg Type: RMS
Avg|Hold:>100/100
Trig: Free Run
#Atten: 50 dB
Mkr1 787.181 9 MHz
-39.646 dBm
Frequency
Auto Tune
Center Freq
787.550000 MHz
Start Freq
787.100000 MHz
Stop Freq
788.000000 MHz
CF Step
90.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin
Start 787.1000 MHz
#Res BW 100 kHz
VBW 300 kHz*
Stop 788.0000 MHz
Sweep 1.000 ms (1001 pts)


Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
02:32:34 PM Dec 09, 2022
Marker 1 806.000000000 MHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 40 dB
Avg Type: RMS
Avg|Hold: 34/100
TRACE 1 2 3 4 5 6
TYPE A WWWWW
DET A N N N N N
Mkr1 806.000 MHz
-65.833 dBm
Ref Offset 4.5 dB
10 dB/div Ref 10.00 dBm
Log
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2
Start 793.000 MHz
#Res BW 6.2 kHz
#VBW 18 kHz*
Stop 806.000 MHz
Sweep 138.7 ms (1001 pts)
MSG
STATUS

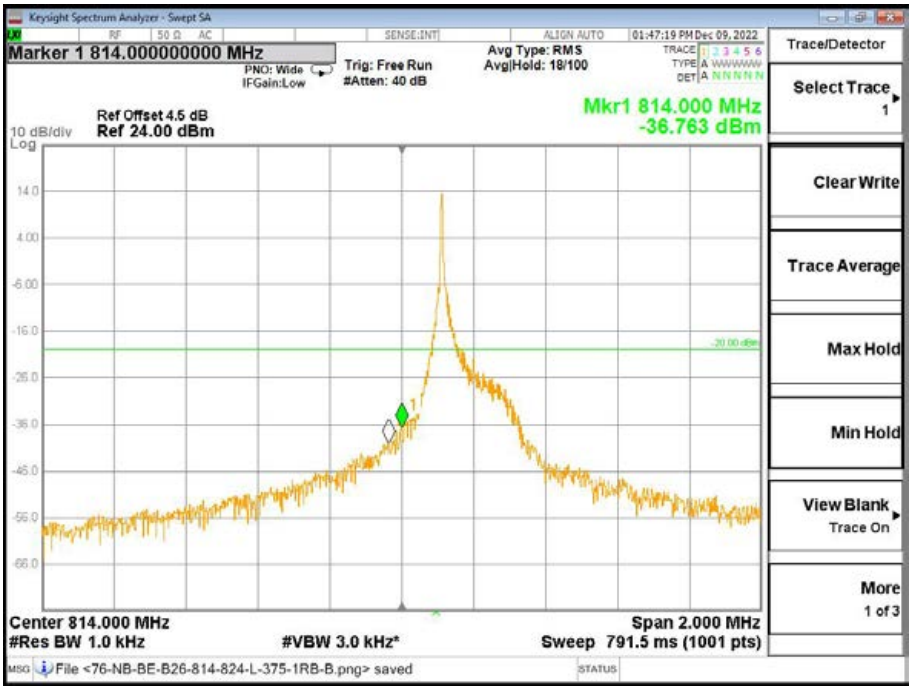




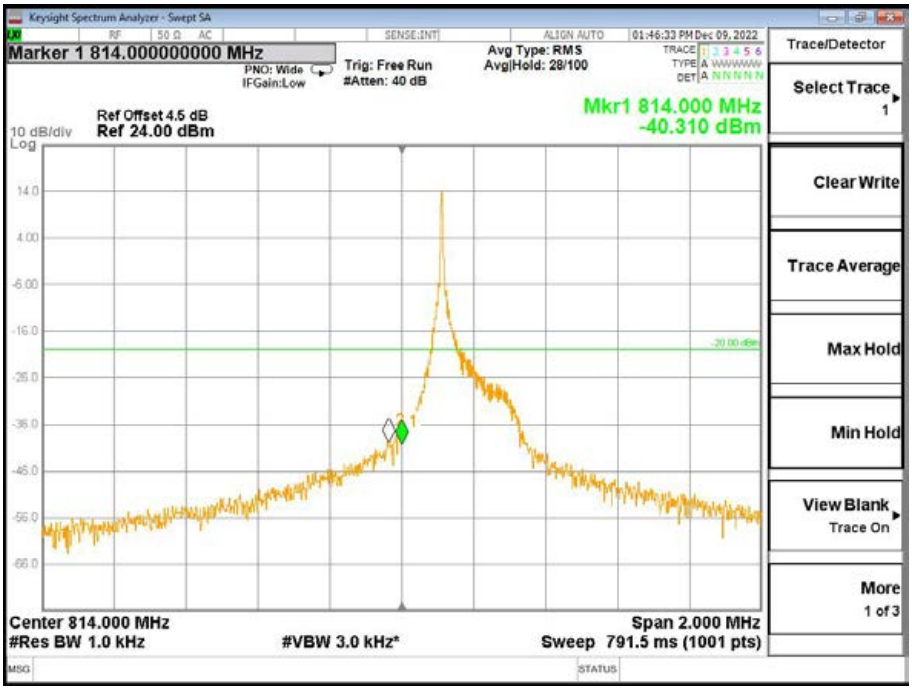
For the 1559-1610MHz test band，the worst case: -47.947dBm+Antenna Gain(4dBi)=-43.947dBm

High Channel, Subcarrier (15kHz), BPSK, 1@11

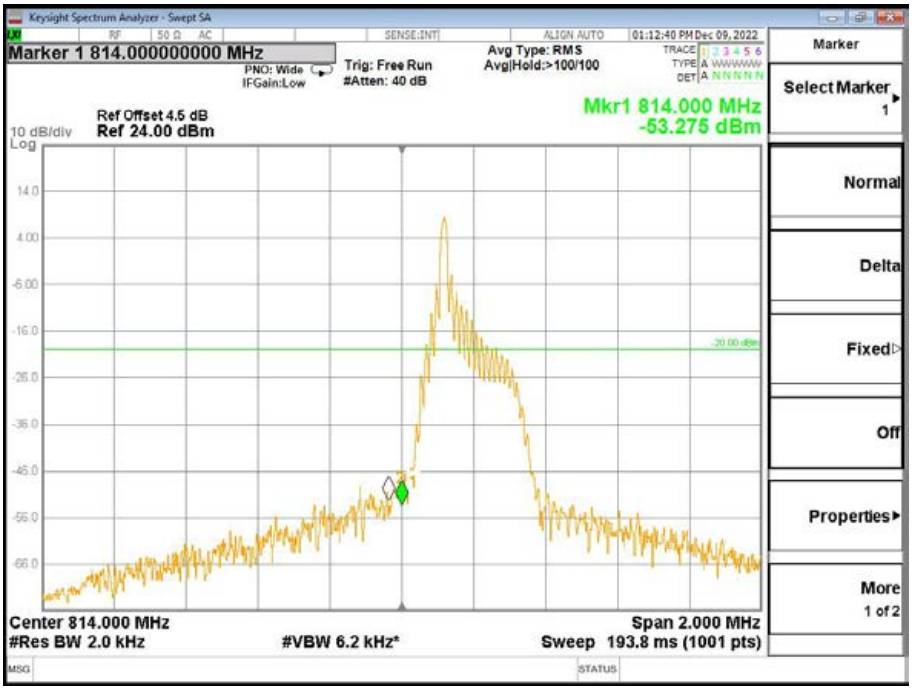
6.7.5 NB-IoT Band 26 Edge Results



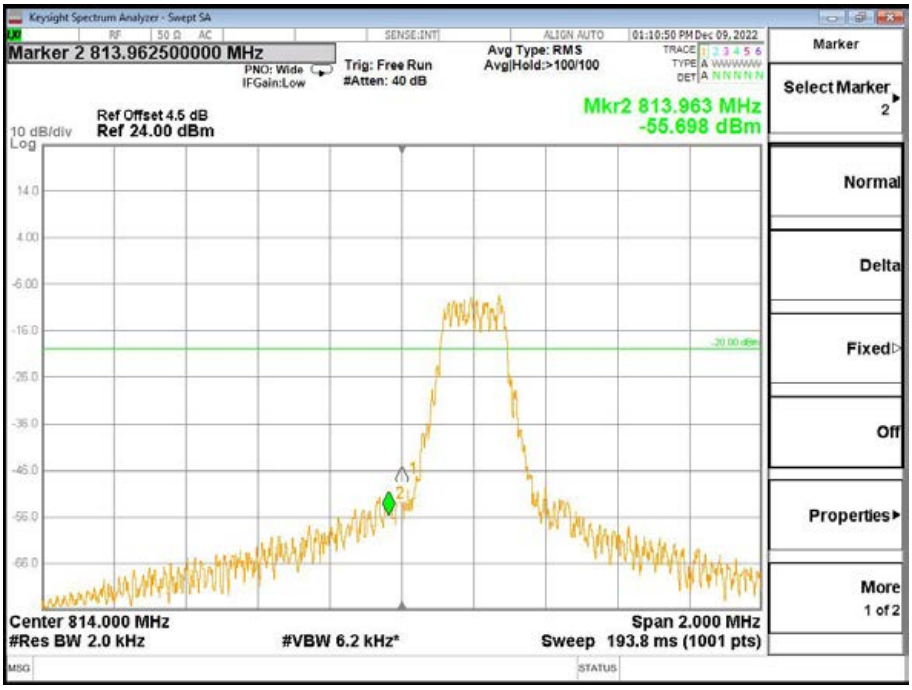
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0



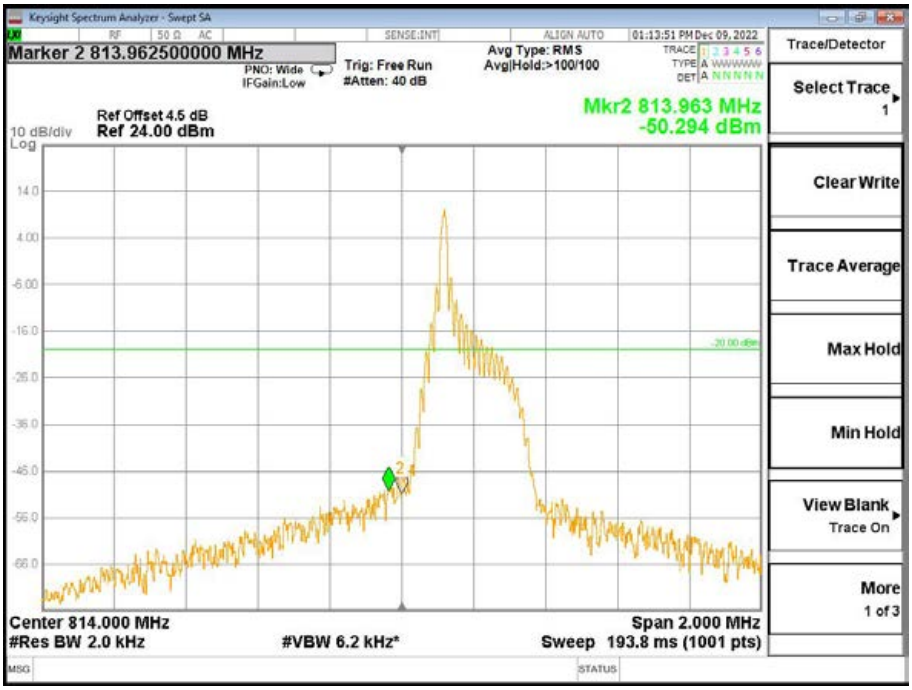
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0



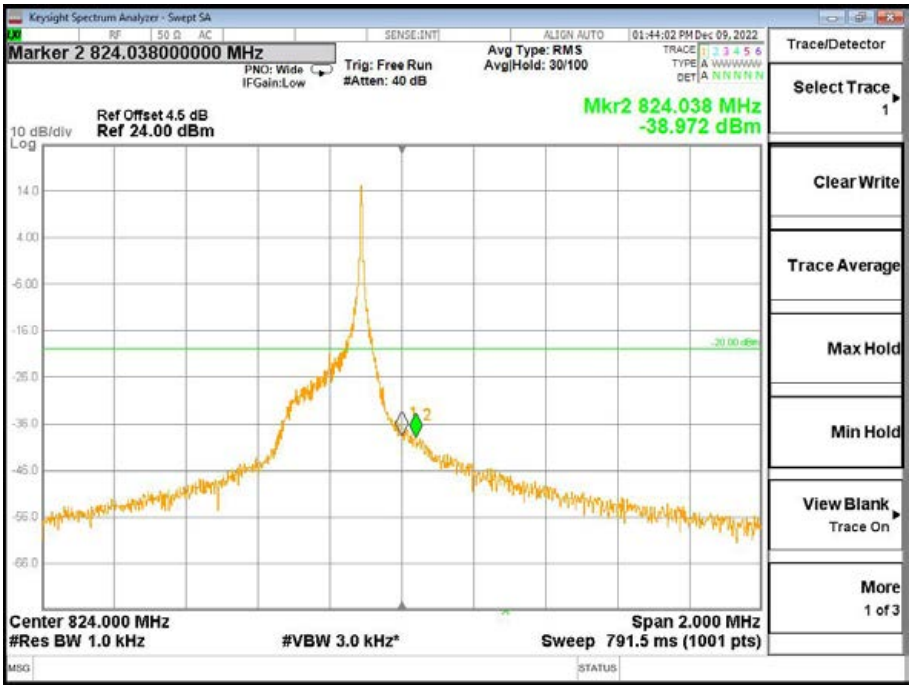
Low Channel, Subcarrier (15kHz), QPSK, 1@0



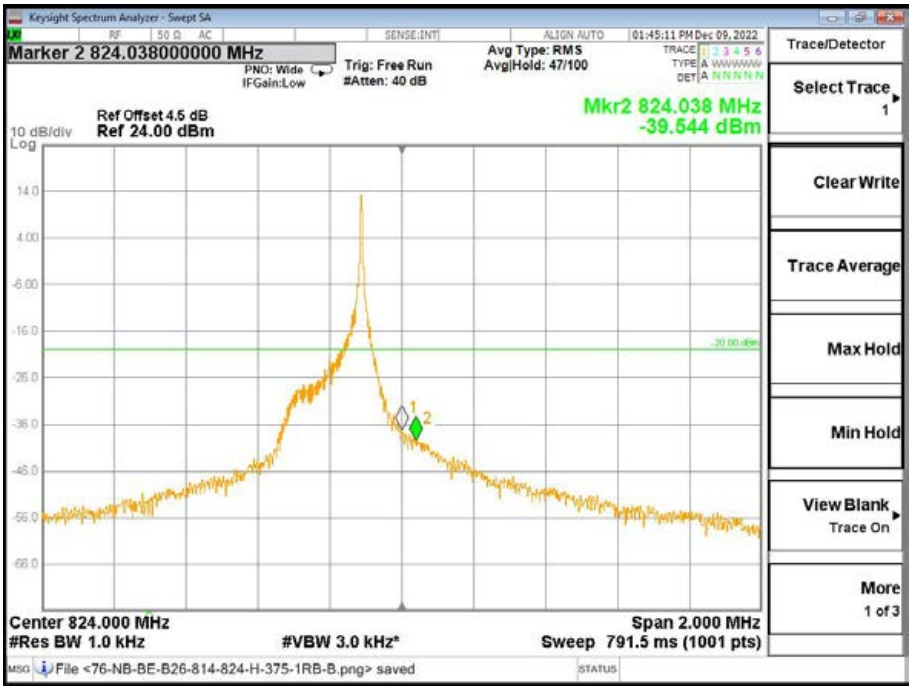
Low Channel, Subcarrier (15kHz), QPSK, 12@0



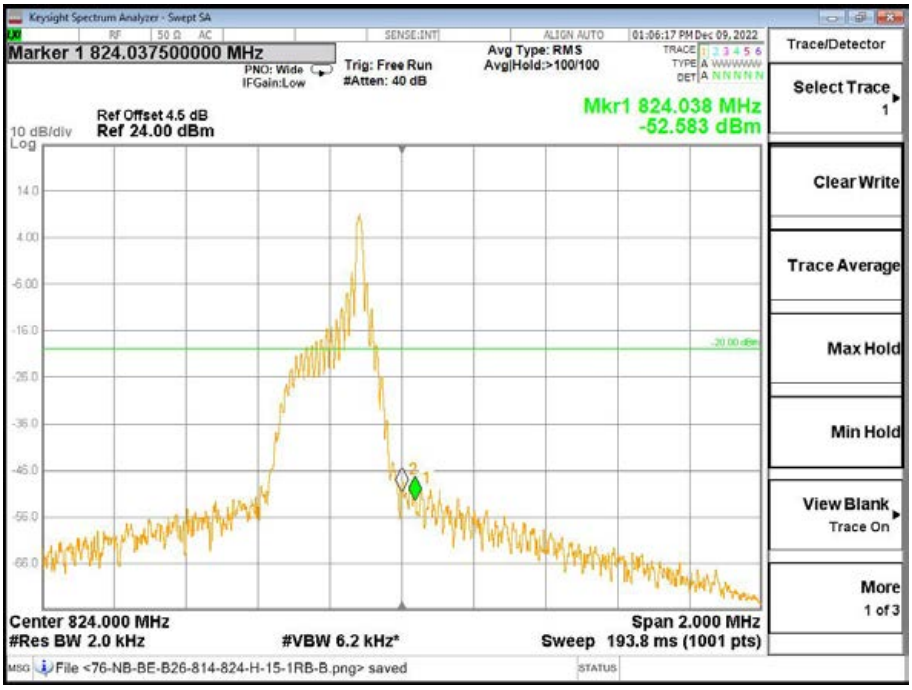
Low Channel, Subcarrier (15kHz), BPSK, 1@0



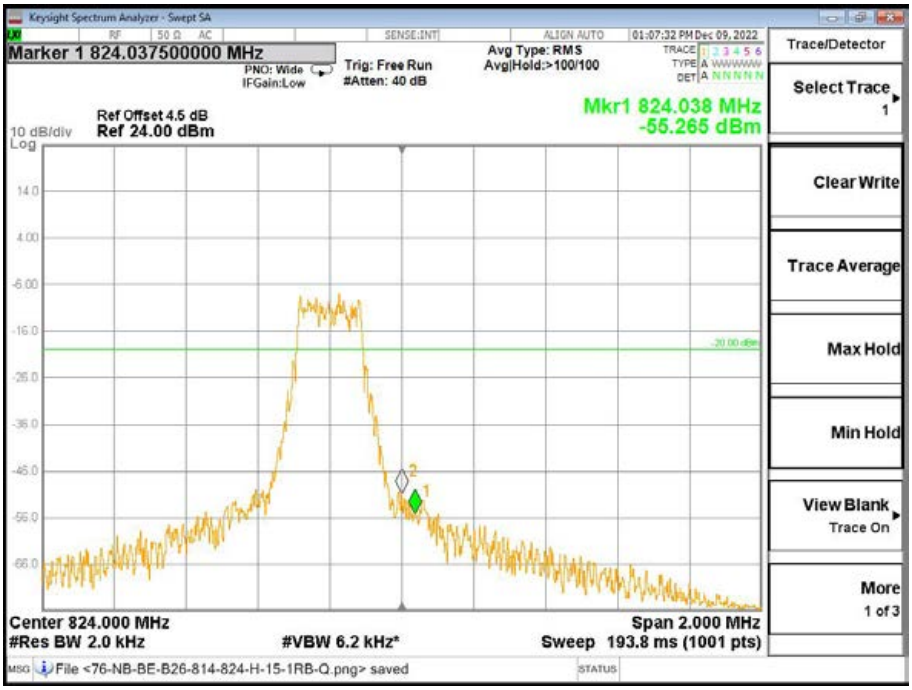
High Channel, Subcarrier (3.75kHz), QPSK, 1@47



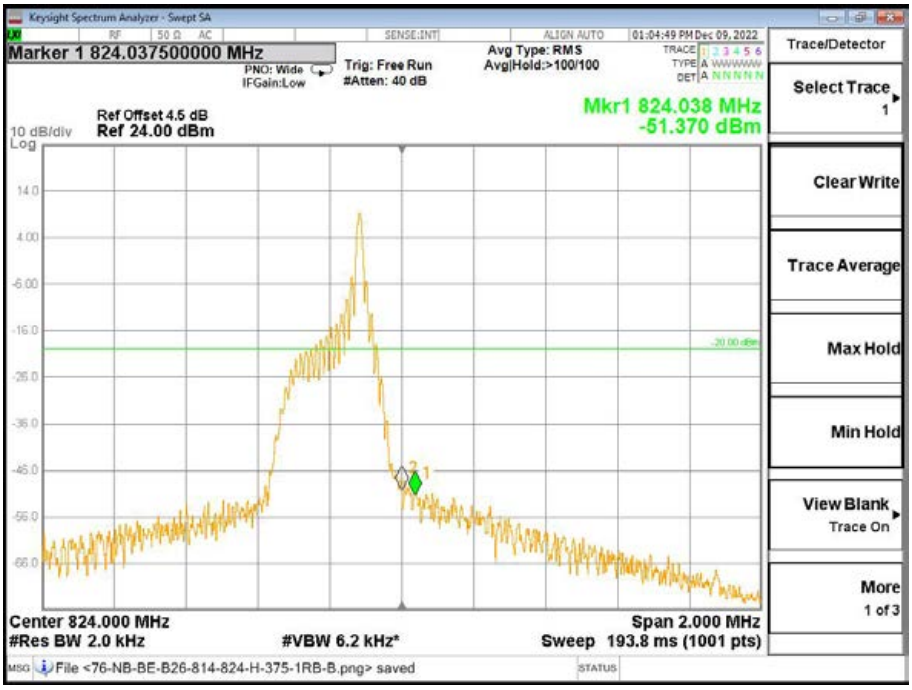
High Channel, Subcarrier (3.75kHz), BPSK, 1@47



High Channel, Subcarrier (15kHz), QPSK, 1@11

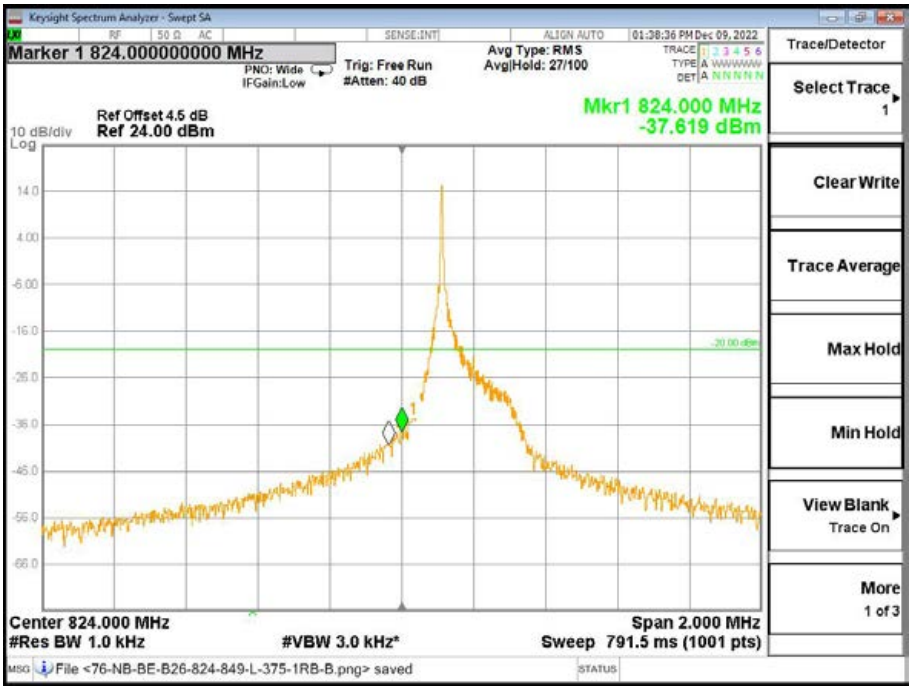


High Channel, Subcarrier (15kHz), QPSK, 12@0

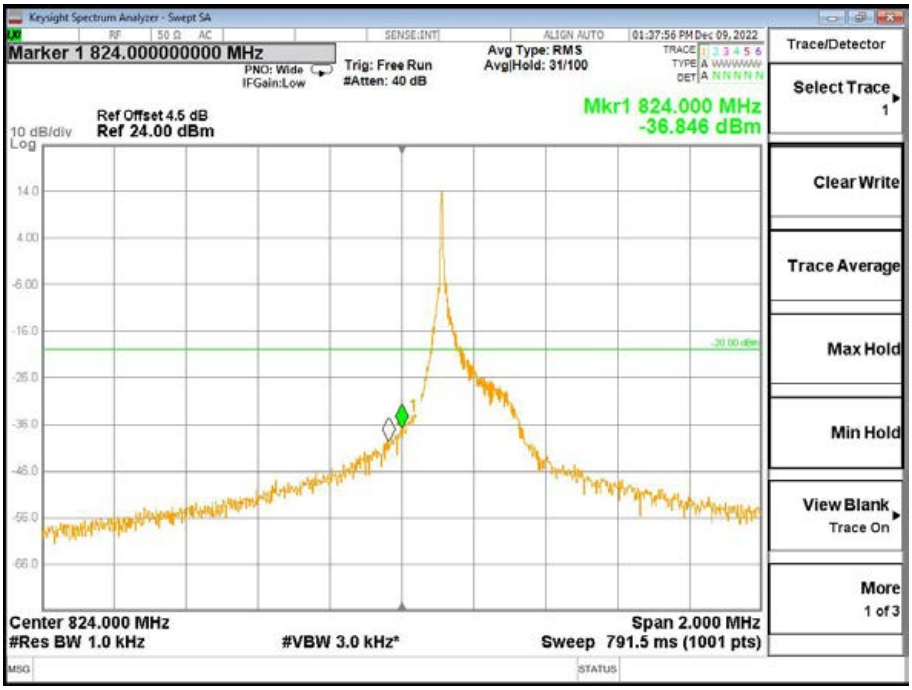


High Channel, Subcarrier (15kHz), BPSK, 1@11

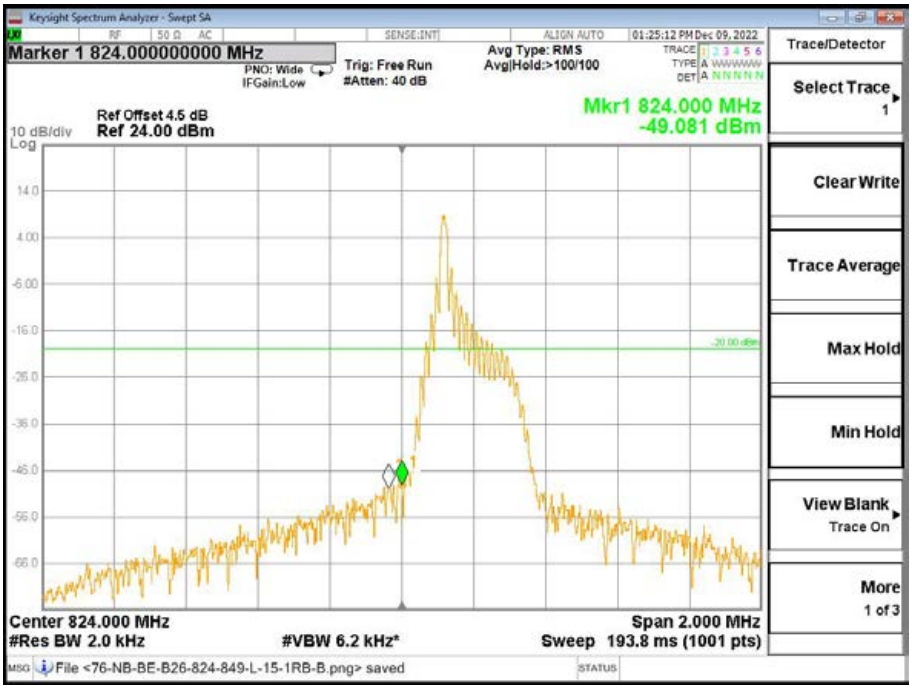
(824MHz-849MHz)



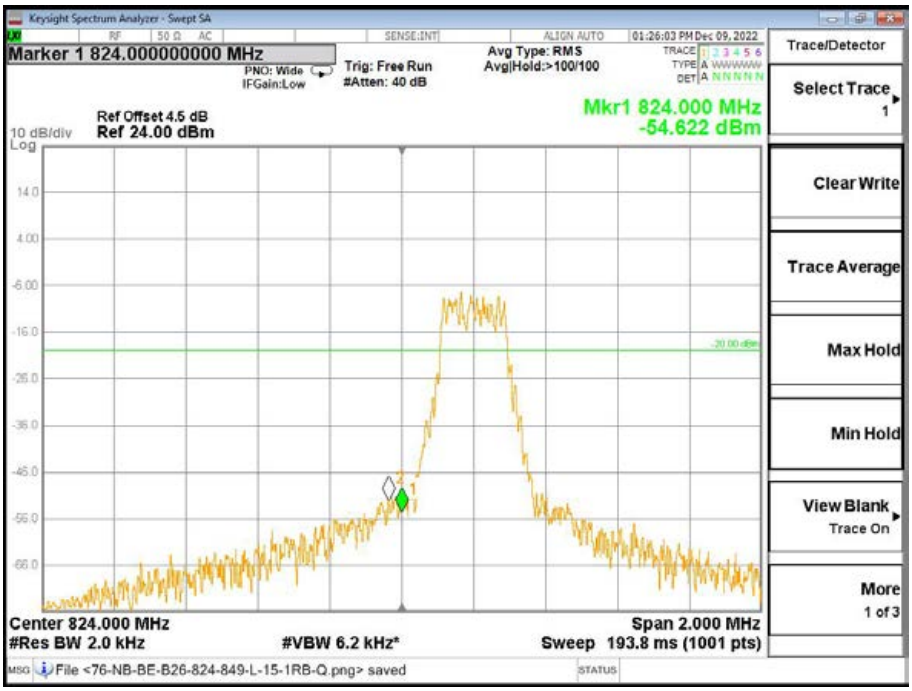
Low Channel, Subcarrier (3.75kHz), QPSK, 1@0



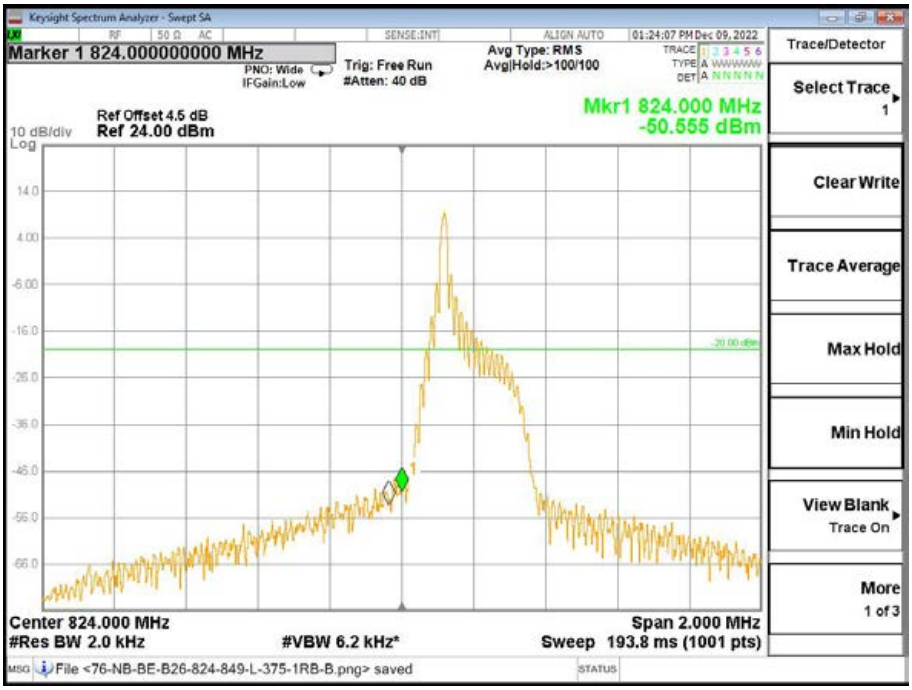
Low Channel, Subcarrier (3.75kHz), BPSK, 1@0



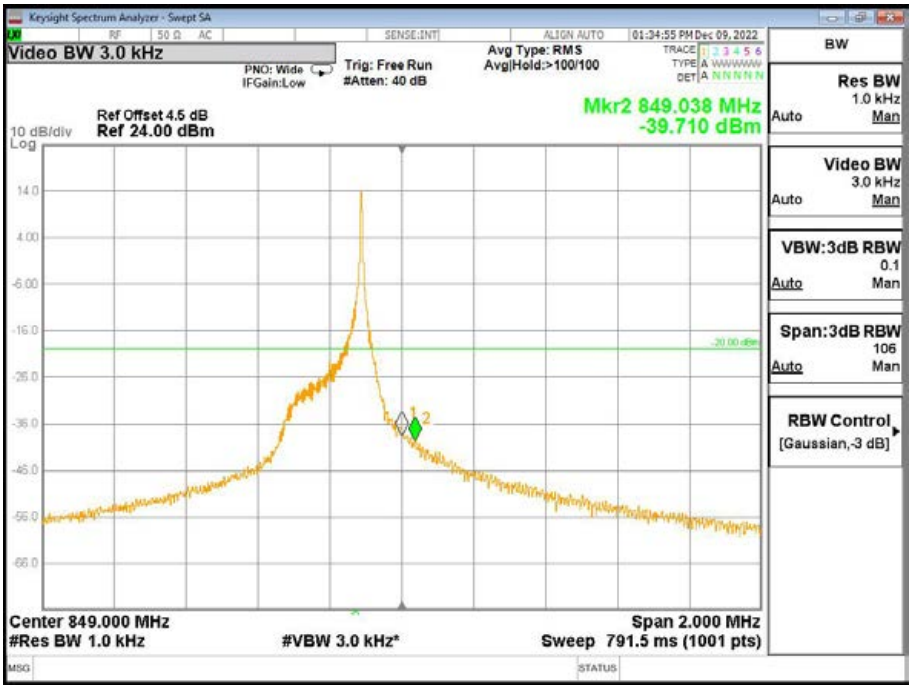
Low Channel, Subcarrier (15kHz), QPSK, 1@0



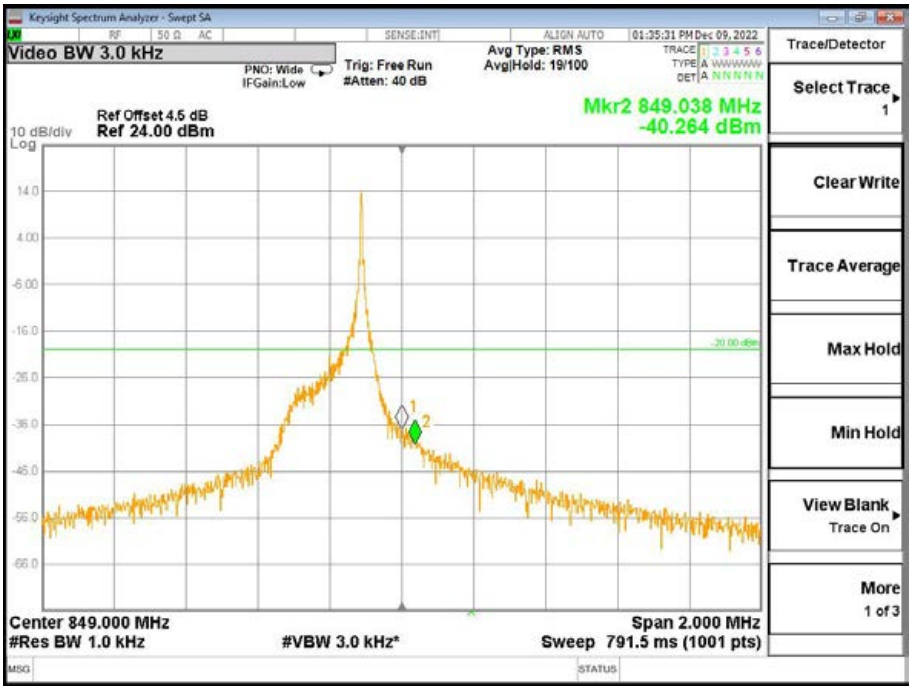
Low Channel, Subcarrier (15kHz), QPSK, 12@0



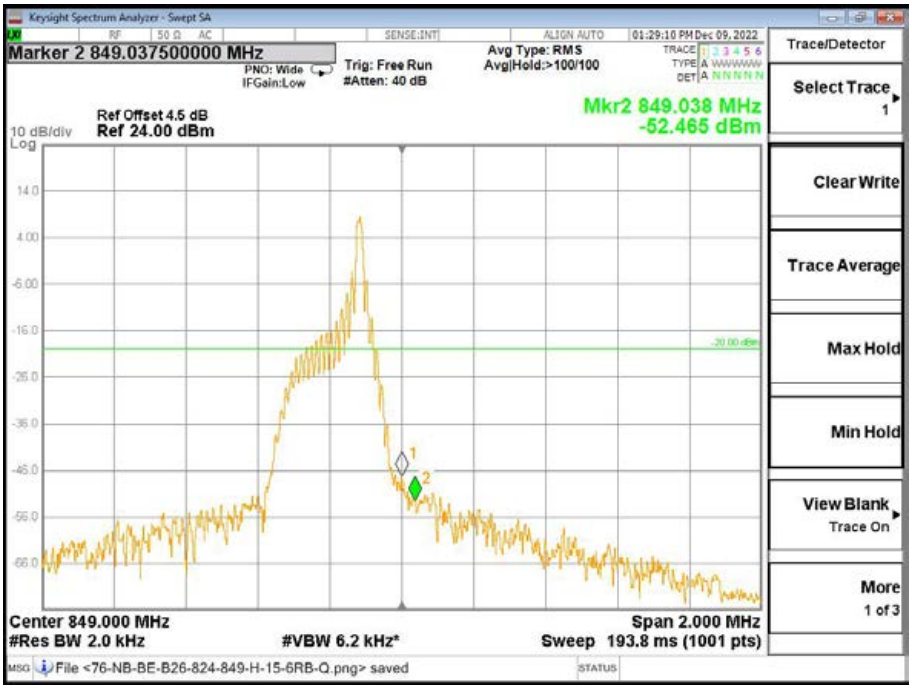
Low Channel, Subcarrier (15kHz), BPSK, 1@0



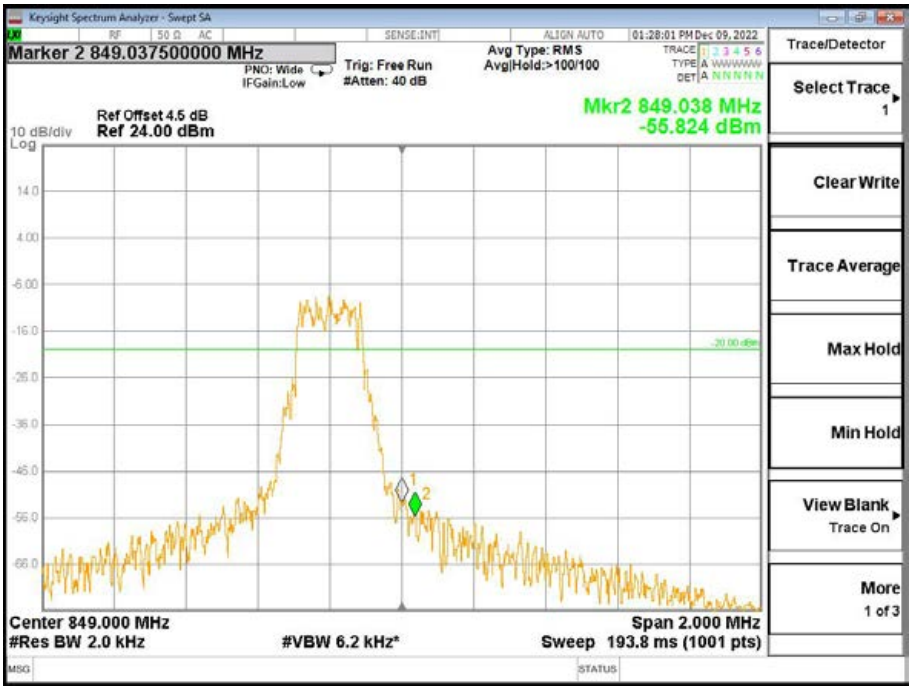
High Channel, Subcarrier (3.75kHz), QPSK, 1@47



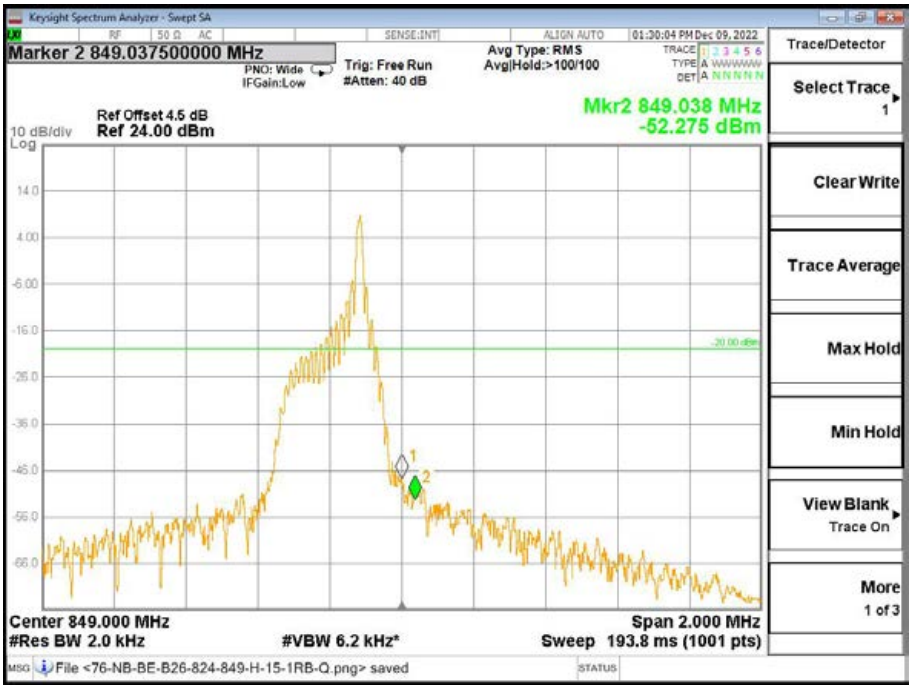
High Channel, Subcarrier (3.75kHz), BPSK, 1@47



High Channel, Subcarrier (15kHz), QPSK, 1@11



High Channel, Subcarrier (15kHz), QPSK, 12@0



High Channel, Subcarrier (15kHz), BPSK, 1@11

6.7. Frequency Stability

Specifications:	FCC Part 2.1055, 22.355,24.235, 27.54,90.213
DUT Serial Number:	866884049909625
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit	
Frequency deviation [ppm]	±2.5

Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	1.54 Hz (k=2)

Test Method

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. Two reference points are established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as FL and FH respectively.

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of CMW500.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.

6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

6.8.1 Frequency Stability over Temperature Variation Results

6.8.1.1 NB-IoT Band Frequency Stability over Temperature Variation Results

Band	Reference channel frequency (MHz)	Offset	Temperature[℃]								
			-30	-20	-10	0	10	20	30	40	50
2	1880	Hz	-9.88	7.11	16.09	18.74	13.69	8.74	9.21	-10.18	-16.48
		ppm	-0.005	0.004	0.009	0.010	0.007	0.005	0.005	-0.005	-0.009
4	1732.5	Hz	-9.63	4.86	9.46	9.48	6.64	5.25	6.79	-8.24	-17.01
		ppm	-0.006	0.003	0.005	0.005	0.004	0.003	0.004	-0.005	-0.010
12	707.5	Hz	-1.63	8.14	8.85	11.43	10.54	6.62	3.42	-1.36	-2.70
		ppm	-0.002	0.012	0.013	0.016	0.015	0.009	0.005	-0.002	-0.004
13	782	Hz	-3.08	4.36	8.25	8.71	8.82	3.88	8.47	-7.16	-8.15
		ppm	-0.004	0.006	0.011	0.011	0.011	0.005	0.011	-0.009	-0.010
26	819	Hz	-5.36	0.80	2.33	3.82	5.43	-2.75	-6.47	-6.24	-13.30
		ppm	-0.006	0.001	0.003	0.005	0.007	-0.003	-0.008	-0.008	-0.016
	836.5	Hz	-3.10	4.68	5.38	5.94	3.22	1.63	4.15	-5.81	-8.71
		ppm	-0.003	0.006	0.006	0.007	0.004	0.002	0.005	-0.007	-0.010

6.8.2 Frequency Stability over Voltage Variation

6.8.2.1 NB-IoT Band Frequency Stability over Voltage Variation Results

Test data:

Band	Reference channel frequency (MHz)	Offset	Voltage (V)		
			3.4	3.8	4.2
2	1880	Hz	9.30	8.74	6.94
		ppm	0.005	0.005	0.004
4	1732.5	Hz	3.58	5.25	4.84
		ppm	0.002	0.003	0.003
12	707.5	Hz	6.75	6.62	6.55
		ppm	0.010	0.009	0.009
13	782	Hz	3.09	3.88	3.81
		ppm	0.004	0.005	0.005
26	819	Hz	-1.39	-2.75	-0.20
		ppm	-0.002	-0.003	-0.0002
	836.5	Hz	5.55	1.63	3.05
		ppm	0.007	0.002	0.004

6.8. Peak to Average Ratio

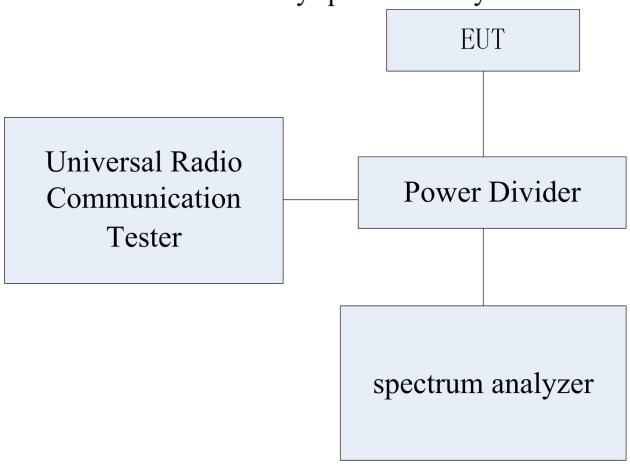
Specifications:	FCC Part 24.232, 27.50
DUT Serial Number:	866884049909625
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit

The EUT meets the requirement of having a peak to average ratio of less than 13dB.

Test Setup

During the test, the EUT was controlled via the Wireless Communications Test Set to ensure max power transmission and proper modulation and measured by spectrum analyzer.



Measurement Uncertainty:

Item	Uncertainty
Expanded Uncertainty	0.62 dB (k=2)

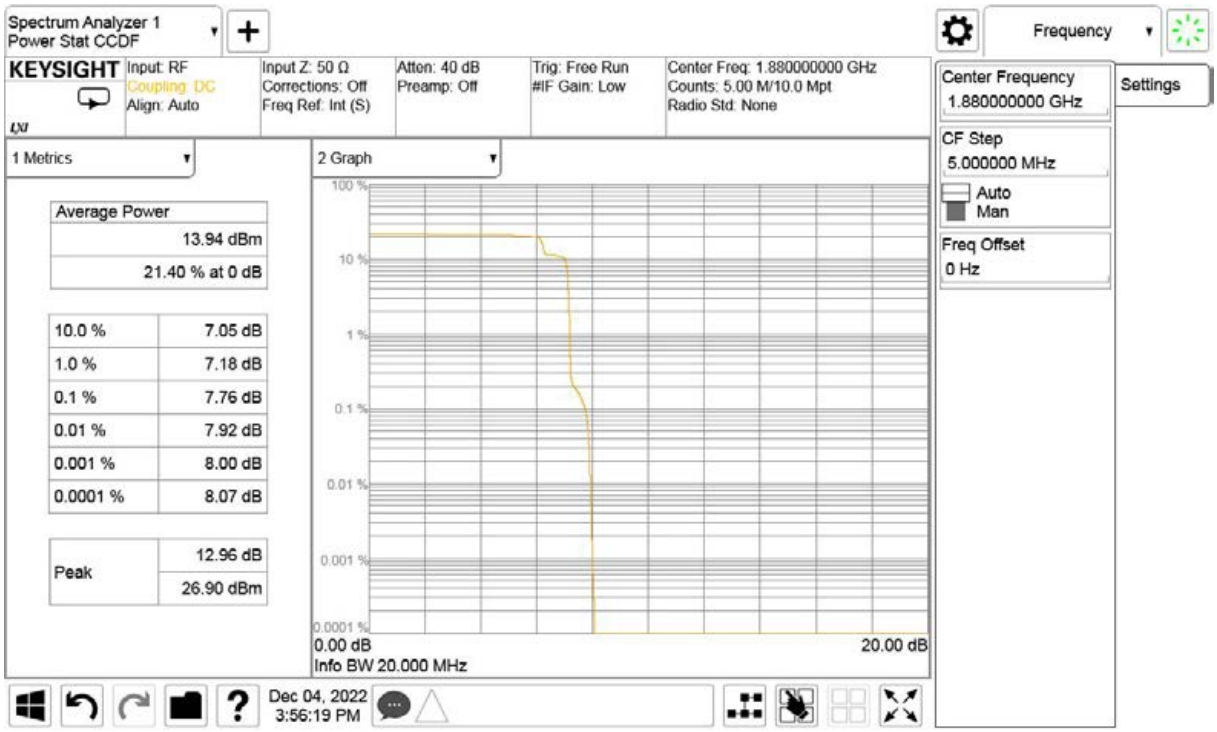
Test Method

The transmitter output was connected to a CMW500 through a coaxial RF cable and directional coupler, and configured to operate at maximum power. The peak to average ratio was measured at the required operating frequencies in each Band on the Spectrum Analyzer.

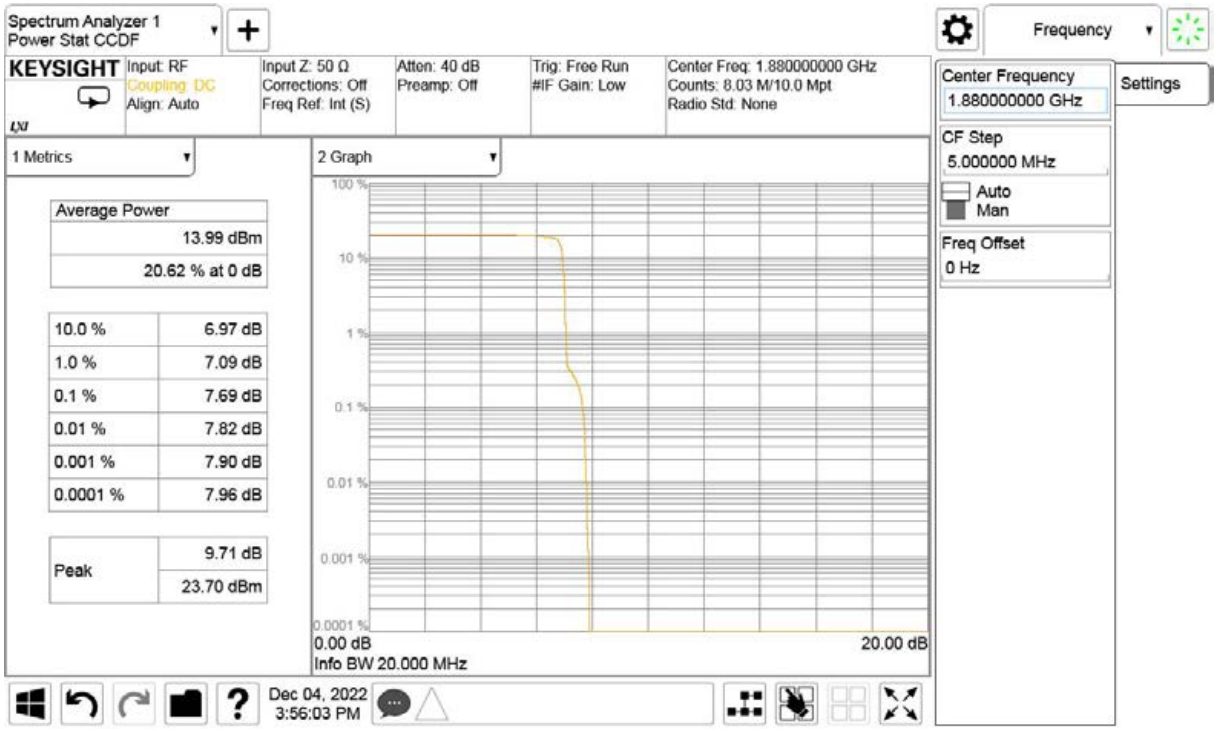
6.9.1 NB-IoT Peak to Average Ratio Results

Mode	Channel	Frequency (MHz)	PAPR(dB) QPSK	PAPR(dB) BPSK
Band2	18900	1880	7.76	7.69
Band4	20175	1732.5	7.74	8.12
Band12	23095	707.5	8.14	8.87
Band13	23230	782.0	8.95	8.20
Band26 （814MH-824MHz）	26740	819	8.45	9.46
Band26 （824MH-849MHz）	26915	836.5	8.20	8.33

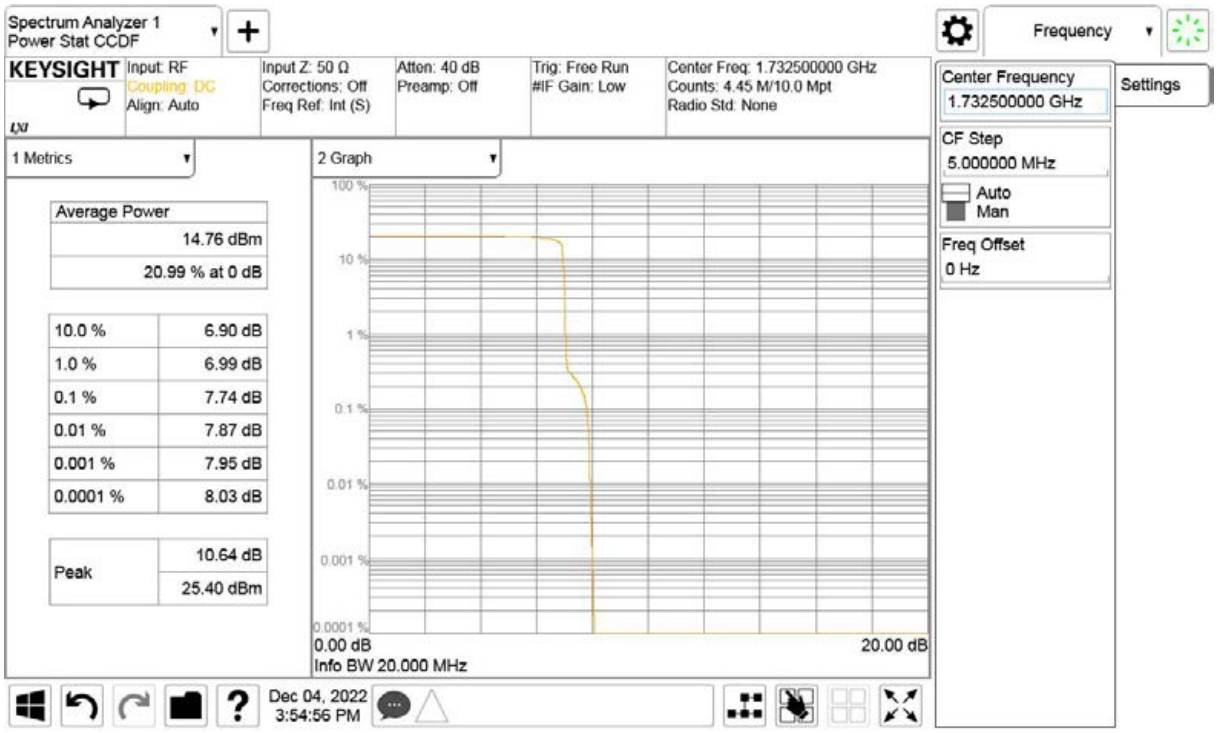
Graphical for Peak to Average Ratio Results for NB-IoT:



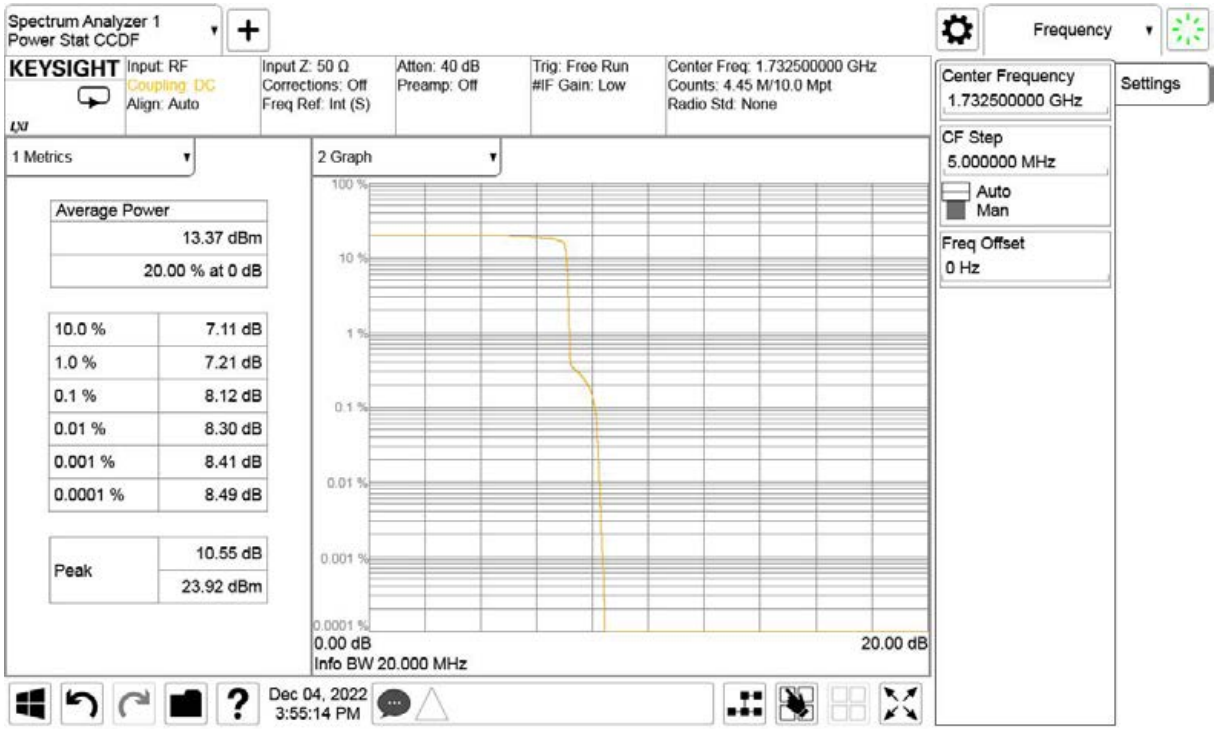
Band2-CH18900-1880MHz-QPSK



Band2-CH18900-1880MHz-BPSK



Band4-CH20175-1732.5MHz-QPSK



Band4- CH20175-1732.5MHz -BPSK